UNIVERSITY OF CAPE COAST

ADEQUACY OF THE SENIOR HIGH SCHOOL SOCIAL STUDIES CURRICULUM IN MEETING THE CHALLENGES OF CLIMATE CHANGE

COLLINS ATO ANOBIL

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BY

COLLINS ATO ANOBIL

Thesis submitted to the Department of Business and Social Sciences Education of the Faculty of Humanities and Social Sciences Education, College of Education Studies, University of Cape Coast, in partial fulfilment of the requirement for award of Master of Philosophy Degree in Curriculum and Teaching

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DECLARATIONS

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …… Date……..

Name:…….

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature …… Date ……..

Name: ……

Co-Supervisor's Signature …… Date ……..

Name: ……

ABSTRACT

The primary purpose of this research was to examine the adequacy of the Senior High School Social Studies curriculum in covering climate related issues. The convergent parallel mixed method design was employed to execute this study. All the eighty-seven (87) Social Studies teachers were purposively selected from the 11 Senior High Schools as well as 19,155 students. A sample size of 320 Social Studies students were selected through the proportionate sampling technique and use the use of table of random numbers. All the 87 Social Studies teachers were included (census) in the study. The main instruments used for the study was questionnaire and semi structured interview guide. The data collected with questionnaire were analysed using descriptive statistics such as frequencies, means, standard deviations, and percentages. Data from the interview were analysed through the thematic approach. The study revealed that there are inadequate climate change issues covered in the SHS Social Studies curriculum. The study concluded that the SHS Social Studies curriculum contained inadequate climate change issues. It was recommended that Social Studies curriculum developers for Senior High Schools in the country should seek to make sure that climate change is adequately covered in a very comprehensive manner in the Social Studies curriculum at the Senior High School level. Social Studies teachers and students should be encouraged to continually update their knowledge about climate by attending climate change conferences and workshops.

KEY WORDS

Adaptation

Climate Change

Climate Mitigation

Climate

Climate Change Issues

Curriculum

National Council for Curriculum and Assessment

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DEDICATION

To my supervisors; Rev. Prof. Kankam Boadu and Dr. Isaac Atta Kwenin

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CHAPTER ONE

INTRODUCTION

Climate change has become a global problem that has attracted national and international concerns because of its effects such as global warming, rise in sea level, distressing agriculture and food security among others. Efforts have been made at both the national and internal level to remedy the problem yet it appears the problem still persist. Climate change problems have been introduced into the curricula of many countries in order to raise consciousness among students and provide them with the necessary skills and information to respond to it. There is still evidence of climate change, such as melting glaciers, rising desertification, and warming of the earth's surface, among other things. A plethora of research on climate change have been undertaken at both the national and international levels, all in an attempt to tackle the problem. Most of these researches focused on students' understanding of climate change, the availability of teaching resources for teaching climate change, or teachers' willingness to teach climate-related subjects in the classroom. This study aims to assess how well senior high school Social Studies curricula handle the problems brought on by climate change. A summary of the study's history, problem statement, purpose, research questions, delimitation, significance, definition of terminology, organization, and delimitation is given in this introduction chapter.

Background to the Study

Every country’s engine of growth and progress is education. This suggests that the importance of education in a country's progress cannot be overstated. It has also become the world’s development engine due to its

important role in human resource development for national growth. It is universally relevant to people's wants and has a significant impact on society and nations' socioeconomic development. It is the most effective weapon for effecting positive social change and developing a generation of responsible persons (IPCC, 2007). It instils in the human mind the ability to reason critically and make wise decisions. Training, career preparation, and societal integration are the main goals of education (Martorella, 1985).

Environmental challenges are capturing the attention of many people, including governments, the media, civil society organisations, and academics. Environmental issues, including climate change, are a source of concern in education, particularly in Social Studies education. This is clear from Michaelis's (1953) assertion that social studies focus on the interaction between humans and their natural and social environments. Education in social studies cultivates conscientious, introspective, and capable people, claims Martorella (1994). Its objective is to increase students' understanding of environmental issues and motivate them to take part in environmental protection initiatives. The subject contributes to raising awareness about the dangers of an unfriendly environment and the necessity to preserve it for the benefit of society (Ngada, 2008).

Social Studies in schools offers a planned and systematic study of subjects like Sociology, Anthropology, Economics, Geography, History, Political Science, and Psychology, according to Banks (2000). This suggests that social studies education equips students with the knowledge, abilities, and mindset needed to identify environmental issues, as well as the causes, effects, and potential remedies. As a result, interdisciplinary and transdisciplinary

approaches are employed to pull material from many domains in order to address varying degrees of environmental difficulties. The presentation of knowledge, development of skills, and cultivation of attitudes are important to these approaches, allowing learners to address the myriad of environmental concerns (Kankam, 2014).

Through the expansion of their knowledge and understanding of society, the Social Studies curriculum provides students with a wide awareness of the difficulties facing the natural and social settings. It is anticipated that the SHS Social Studies curriculum, which has an environmental focus, would sufficiently cover the idea of climate change and related issues and give students the abilities, information, and real-world experience to deal with the problems that need to be solved in regard to climate change.

Climate change is one significant environmental issue that social studies educators are focused on. The Intergovernmental Panel on Climate Change (IPCC, 2007; Sharma, 2012) states that natural phenomena like ocean currents, volcanic emissions, and normal temperature fluctuations, as well as human activities like deforestation, intensive agriculture, and extensive fossil fuel use, all significantly contribute to climate change.

Diverse tactics are being employed to tackle the issues associated with climate change. For instance, the Intergovernmental Panel on Climate Change (IPCC) was formed by the World Meteorological Organization and the United Nations Environment Programme to evaluate socioeconomic, scientific, and technical data pertinent to comprehending climate change, its possible impacts, and existing adaptation measures (Salisu, 2011). In order to better equip its students to educate common citizens, particularly farmers, the president of the

Africa University College of Communication (AUCC) stated a wish to restructure the curriculum to incorporate climate studies (OmgGhana, 2013). Vietnam's government has made climate change adaptation a top priority since it recognizes the threats posed by the phenomenon. The Ministry of Education and Training (MOET) of Vietnam developed the MOET Action Plan on Education Sector Response to Climate Change (UNESCO, 2009). According to Dalelo (2012), the curriculum in Ethiopia incorporates climate change issues into the biology curriculum; in the United States, the curriculum in science incorporates climate change (Tomasevic, 2013); and in Malaysia, the curriculum in endangered ecosystems includes climate change instruction in fourth grade biology (Karpudewan, Roth & Chandrakesan, 2015).

The Social Studies curriculum has been acknowledged as a crucial instrument for tackling environmental issues, especially those pertaining to climate change, because of its integrated and mainstreaming nature, which incorporates other social science courses like geography, economics, history, etc. Certain subjects, such ss Integrated Science and Geography, have been added to the SHS curriculum in order to give students in Ghana the knowledge they need to address social issues like climate change (Ghana Education Service, [GES] 1987).

There have been attempts in Ghana to incorporate curriculum related to climate change into basic, secondary, and tertiary education (GhanaCentric, 2010). The identification of pertinent mitigating measures can be facilitated by including it into the educational curriculum. One curriculum subject that corresponds with this integration is social studies. The pre-tertiary Social Studies curriculum has been specially designed for incorporation into the

regular school curriculum at all levels of education because it serves a unique role in training pupils to deal with environmental concerns like climate change. This is consistent with the claim made by GES (2010) that Social Studies instruction should develop students' cognitive, emotional, and psychomotor domains to enable them to address social issues from several perspectives. Students learn about the methods that should be used to address the social and environmental issues that are currently facing society in social studies class. Thus, Social Studies provides an opportunity for students to take an interdisciplinary approach to social and environmental challenges.

As a problem, climate change deserves a multidisciplinary approach in solving it, and this approach is built into Social Studies education as a distinguished curriculum package. Thus, it is essential to teach kids about the causes, consequences, and solutions of climate concerns. This is due to the fact that the purpose of social studies is to produce informed citizens who are ready and able to support their nation's progress on all fronts (Martorella, 1985). In this development, Social Studies uses inherent mechanisms in teaching methods such as discussion, inquiry, field trips, and project work, among others, to instil the skills and desirable attitudes required to resolve environmental problems (Ngada, 2008).

Although Social Studies is geared toward the provision of skills, inculcation of desirable attitudes and knowledge about environmental issues, it appears much research has not been conducted to explore how adequate the SHS Social Studies syllabus covers environmental issues specifically climate change in Ghana, hence this research.

Statement of the Problem

For the sake of national development, it is imperative that students learn about the causes, effects, and mitigation strategies for climate concerns. Bangay and Blum (2010) contended that formal education is the key to addressing the issues posed by climate change. According to their argument, formal education—as determined by its curriculum—is just as important as health, and those with higher education levels are better equipped to recognize and manage the hazards associated with climate change (p. 45).

Education has also been proposed as a means of disseminating the knowledge required to handle local climate challenges on a worldwide scale (Gowda, Fox, and Magelky 1997). Education does, in fact, have a significant impact on increasing youth awareness (Taber & Taylor, 2009). The IPCC (2013) report, which asserts that integrating climate change topics into the curriculum is the best approach to manage them, supports this. This clearly shows that education is the most effective way to inform the people on the causes, consequences, and solutions related to climate change.

According to Kankam (2016), Social Studies is the only school subject that places a strong emphasis on the comprehensive integration of nation-building themes and content that touches on issues related to people, attitudes, values, beliefs, and problem-solving abilities in addition to environmental concerns. Resnik (2006) and Benavot (2002), as referenced in Kwenin (2021), state that social studies education is widely accepted as a useful instrument for tackling environmental issues, such as the difficulties posed by climate change.

GES (2010) states that while the Senior High School Social Studies curriculum includes some themes connected to climate change, such as acid

rain, flooding, and global warming, it may not go far enough. Both teachers and students' level of understanding in social studies may be impacted by this. Furthermore, it is uncertain if the teachers in Social Studies classes employ effective teaching techniques when covering themes connected to climate change. This may also have an impact on how ready Social Studies students are to handle the difficulties brought on by climate change.

Once more, the syllabus emphasises the environment and explains the concept of the "physical environment," as well as how and when people in Ghana are exposed to it, how some nations have modified their environments to suit their needs, and how Ghana can follow suit (GES, 2010). All of this is covered without specifically addressing climate change. This seems to imply that pupils' preparation for climate change is insufficient.

Additionally, a number of researches on this subject have looked at the awareness of climate change among teachers and pupils (Ekpoh, & Ekpoh, 2011; Owolabi, Gyimah & Amponsah, 2012). Onkargouda et al. (2013) looked into how the media shapes public perception of climate change. Additionally, Edward, Ogendi, and Mackenzie (2014) examined indigenous coping and adaptation techniques among farmers in Kenya without considering their knowledge level or the difficulties they face. Teachers' opinions about adding climate change adaptation techniques to secondary school agriculture curricula were examined by Mutiso, Obara, and Kibtte (2014). Without considering pupils who might appear to be negatively impacted by the effects of climate change, these researchers focused solely on agriculture teachers. The incorporation of climate change education into secondary school agriculture curricula was examined by Michael et al. (2014).

However, Aja (2015) investigated the consequences of climate change. Few empirical studies, like Konadu (2014), have been conducted in Ghana that evaluate how well the senior high school geography syllabus addresses the difficulties posed by climate change in the Ashanti Region of the country. Her research ignored the knowledge of students who are thought of as social change agents in favor of concentrating solely on the expertise of head teachers and geography teachers. Baker (2015) looked into how social studies teachers in the Cape Coast Metropolis responded to the climate. Although his research shed light on the current status of climate-related topics covered in the Social Studies curriculum, it did not address the challenges associated with doing so.

Abaidoo (2016) assessed the knowledge and responses of University of Cape Coast students regarding climate change in Ghana's Central Region. Odoom (2020) looked into the factors that help or hinder Cape Coast Metropolis, Ghana's Basic Education level, from adding climate change education as a new curriculum area. Kwenin (2021) also studied how social studies instruction lessens climate-related problems at the junior high school in Cape Coast Metropolis. His research concentrated on the social studies curriculum for junior high schools, but the current study was more concerned with the curriculum for senior high schools, therefore there were gaps in the background, population, content, and methodology. Particularly in SHS in the Cape Coast Metropolis, there seem to be gaps in the Social Studies curriculum when it comes to studies on climate change. Therefore, the topic was selected to close these gaps.

Purpose of the Study

The main purpose of this study was to examine the adequacy of SHS Social Studies curriculum in covering climate related issues. Specifically, the study sought to:

1. examine how adequate the SHS Social Studies curriculum covers climate change issues;
2. explore Social Studies teachers' and students' level of knowledge about climate change;
3. explore methods appropriate for teaching climate-related issues in the curriculum;
4. explore how the SHS Social Studies curriculum prepares SHS students to respond to the challenges of climate change;
5. ascertain Social Studies teachers' and students' views on the challenges of Social Studies education in responding to climate change issues.

Research Questions

The study was guided by the following research questions:

1. how adequate the SHS Social Studies curriculum covers climate change issues?
2. what are Social Studies teachers' and students' level of knowledge about climate change?
3. what appropriate methods are used by Social Studies teachers in teaching climate-related issues in the curriculum?
4. how does the SHS Social Studies curriculum prepares SHS students to respond to the challenges of climate change?

5. what are Social Studies teachers' and students' views on the challenges of Social Studies curriculum in responding to climate change issues?

Significance of the Study

The study will benefit academic institutions, instructors, curriculum developers, researchers, and high school students studying social studies. In particular, the university faculty members who train Social Studies teachers will find it informative. The study's conclusions will give GES, the ministry of education, and curriculum designers insight into how well the Social Studies curriculum addresses climate-related challenges. The study reveals the approaches taken by Social Studies instructors to teach curriculum-related climate change concerns. The results of the survey will also highlight the degree of climate change awareness among Social Studies instructors and students. This will assist social studies educators in choosing the best techniques for addressing climate change in their lessons.

Once more, it will broaden our understanding of how Social Studies instruction equips students to address the difficulties posed by climate change. The results of the study will also shed light on the opinions of Social Studies instructors and students regarding the difficulties of reacting to issues related to climate change and the readiness that social studies education provides for students to do so. The researcher hopes that the Ministry of Education's National Council for Curriculum Assessment (NACCA) will benefit from the findings.

Delimitation of the Study

The study was delimited to the adequacy of the Social Studies curriculum in covering the challenges of climate change. The Cape Coast

Metropolis was the exclusive focus of the investigation. Only SHS Social Studies instructors and students in the Cape Coast Metropolis provided data for the study. The study concentrated on the degree of understanding that Social Studies instructors and students have on theories, causes, and effects of climate change. Once more, the investigation was restricted to using convergent parallel design and mixed techniques methodology. The Cape Coast Metropolis's senior high schools can use the study's findings.

Limitations of the Study

The study like any other research was not devoid of limitations. First, some of the respondents did not take their time to read the items carefully before completing the copies of the questionnaire. Some also did not follow the instruction. Some respondents also did not complete responding to sections of some questionnaire even though I spent about 20 minutes to explain some of the items. The interviews were sometimes interrupted by other teachers and other students which the researcher believes may affect the results of the study. But measures were adopted by the researchers to minimize the impact This was done before the questionnaires were issued out. However, the researcher edited all the questionnaire returned and ruled out all the incomplete items on some questionnaire.

Operational definition of Terms

The following terms have been explained as used in the study:

Adaptation: Adaptation refers to changes in ecological, social, or economic systems as a result of real or anticipated climatic stimuli, as well as their ramifications or impacts. This includes changes or adjustments to procedures,

methods, and structures in order to mitigate potential harm or capitalize on possibilities connected with climate change.

Climate Change: The long-term changes in the statistical distribution of weather patterns (e.g., temperature, precipitation, and so on) over decades to millions of years.

Climate Mitigation: This refers to efforts done to alleviate the negative effects of climate change.

Climate: The study of the average weather conditions of the lower atmosphere of a place studied over a long period time, usually 30 years and above.

Climate change issues: This is knowledge included in the Social Studies curriculum, such as definitions, causes, impacts, and mitigating techniques.

Curriculum: Refers to a document containing information in the form of concepts, theories, generalisations, laws/principles, skills, values mong others to be imparted unto learners. In this context, the researcher is referring to the 2010 Social Studies GES syllabus.

NaCCA: This organization, which works under the Ministry of Education, is in charge of creating curricula and instructional materials for Ghana's pre-tertiary institutions, both public and private.

Organisation of the Study

There were five chapters in the study. The first chapter was devoted to the introduction, which included a synopsis of the study's history. Along with the study's goal, the problem statement was also included. Chapter One outlined the research questions that served as the study's compass. This chapter outlined the study's importance, its boundaries, its limitations, the definitions of its words, and its organizational structure. The review of related literature occupied

Chapter Two. The conceptual, theoretical, and empirical reviews—each having a sub-theme—are included in the review. The methods used by the researcher to conduct the study were covered in Chapter Three. This chapter included information about the population, research instruments, and study strategy. This chapter also covered the data collection process and the data analysis plan. Chapter Four included a discussion, findings, and the outcome. A summary, conclusions, and suggestions for enhancing practice based on the study's findings and for additional research were given in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

Introduction

An overview of relevant literature on the subject at hand is provided in this chapter. There are two key components to the review. A conceptual explanation of climate change and a thorough description of the theories supporting the study were given in the first section. The researcher was able to make sense of the study's findings and determine if senior high school curricula adequately addresses the challenges posed by climate change thanks to this conceptual explanation of climate change. Empirical research and conceptual reviews on the subject were included in the second half of the review. The researcher was able to place the study's findings within the larger context of what is currently known about the subject thanks to this review. The evaluation specifically addressed the conceptual framework, theoretical review, and curriculum design of social studies. It also addressed how Social Studies curricula should address climate change challenges. They also carefully considered the origins and effects of global warming.

Theoretical Review

The study adopted the Seven Theories of Climate Change from Bast, (2010). This was because it has been tried and tested by many climate change scholars and found them to be authentic. The issues raised in the theory give comprehensive information about the causes and the various process leading to climate change. The following headings are used by the theory to categorize the causes of climate change. These theories aided the conceptual understanding of

climate change. The theory grouped climate change issues under the following headings.

The Anthropogenic Global Warming Theory

The term "anthropogenic global warming theory" has two meanings. The first holds that greenhouse gas emissions caused by humans will cause a noticeable increase in global temperatures. This assertion is prognostic. This can be seen, for example, in the widely accepted range of future scenarios included in the 2001 report from the Intergovernmental Panel on Climate Change (IPCC), which concluded that we should expect a warming of between 1.4 and 5.8 degrees Celsius between 1990 and 2100 in the absence of effective climate policies (IPCC, 2001). The second viewpoint holds that the global climate has already been significantly impacted by human activity. This is a claim that applies to both the past and the present. This is reflected in the well-known IPCC assessment from 1996, which found, based on the weight of the evidence, that there is a detectable human influence on the global climate. The 2001 report provides new and stronger evidence that human activity is primarily responsible for most of the warming observed over the previous 50 years, significantly supporting this conclusion (IPCC, 2001). The debate over whether natural or human-dominated processes are the primary causes of climate change carries on in light of the discussion that has already taken place and the conclusions drawn from the body of research. The ideas that underpin the Anthropogenic Global Warming Theory are presented in these two popular arguments.

The notion that people can and do change the planet's climate is the foundation of the anthropogenic global warming theory, according to Arrhenius

(1938), and this belief has developed over the course of more than a century. Early in the twenty-first century, it was a fringe theory; by the early twentieth century, it is getting close to an established scientific consensus. Almost all skeptic climate scientists who have bothered to carefully and objectively review the data have come to accept the initially absurd theory of human-caused global warming over time. However, the underlying problems are rarely discussed because there are so many new advancements in the field that happen practically every year, such as our growing understanding of abrupt climate change, the 2005 record hurricane season, or resurgent concerns about the stability of ice sheets.

On the other hand, Stallinga and Khmelinskii (2016), link anthropogenic theory to belief. They draw attention to the fact that the so-called Anthropogenic Global Warming (AGW) theory is just one of several catastrophic models that have been proposed, and that society as a whole is terrified of potentially disastrous climatic scenarios. There's always room for new ideas, even if all the old ones have been disproven. Going one step further, Stallinga and Khmelinskii connect this theory to the past of Christian prophecies of the end of the world. Their example is followed by other religions with a similar ideology. Since religion is by definition tied to faith, there are too many references to religion in this topic. Stalinga and Khmelinsky conclude that a concept can proliferate in society as long as the host, society, is open to it. People are open to catastrophic ideas, which makes society open to them.

A study named Reaching for Equilibrium was carried out by Ouellette (2012). The two primary pillars of the theory of anthropogenic global warming (AGW) are without a doubt the two observations of global warming since the

early 20th century and the consistent increase in atmospheric CO2 concentration since the beginning of the industrial era, which is supported by both proxies and actual measurements at Mauna Loa and other stations since 1958. Since CO2 is a powerful greenhouse gas, an increase in its concentration can account for the accompanying warming. Estimates of CO2 forcing integrated into global circulation models provide strong evidence of greenhouse gas emissions from human activities, including aerosol forcing and water vapor feedback.

However, this theory is also based on another self-evident assumption: that human CO2 emissions are themselves responsible for the accumulation of CO2 in the atmosphere. As evidenced by the isotope-to-carbon ratio, which indicates that most of the remaining emissions have been absorbed by the oceans, there does appear to be a relationship between emissions and CO2 concentration (Sabine et al. 2004).

But Ouellette (2012) concluded that there are still some intriguing questions concerning the carbon cycle that need to be answered. Nonetheless, the most accurate estimates of human emissions indicate that the annual increase in atmospheric CO2 concentration is not equal to that of the air fraction, which is approximately 55%. Rather, it is increasing at a fraction of the air fraction. It is unknown how the other elements of the carbon cycle manage to absorb the remaining emissions, neither more nor less. Furthermore, he stated that the concentration of CO2 is not rising in tandem with human emissions. Even while human emissions rise monotonically over time, the rate of change in CO2 concentration varies considerably on a monthly basis by an amount equal to the total of those emissions. Not to mention, the carbon cycle

is extremely dynamic. Just 3% of the overall interchange between the atmosphere, land biomass, and oceans is attributed to human emissions (Ouellette, 2012). This seems to indicate that the influence of humans is negligible. However, it appears to be enough to upset the cycle, which would otherwise be in perfect balance as it has been for thousands of years (Ouellette, 2012). In addition, proponents of climate change due to naturally occurring forces have advanced hypotheses related to ocean currents, planetary motion, solar variability, cloud formation and albedo, biothermostat, and ocean currents.

Bio-Thermostat Theory

According to biothermostat theory, negative feedbacks from biological and chemical processes fully or almost fully offset the positive feedbacks caused by increased CO2. These processes act as a global biothermostat, maintaining temperature balance. At least eight of these feedbacks have been documented in the literature. Carbon fixation, carbonyl sulfide, diffuse light, iodocompounds, dimethyl sulfide, and other aerosols are the subjects that explain these feedback (Bast, 2010).

Carbon Fixation or Sequestration

Plants' increased ability to sequester carbon is arguably the most well-known effect of the increase in atmospheric CO2. Since CO2 is the main raw element that plants require to build their tissues, most plants have higher productivity. When atmospheric CO2 levels are higher, plants take in more CO2 and store it in their leaves, branches, trunks, roots, and the soil underneath them. Elevated temperatures also typically lead to higher rates of carbon sequestration. Sequestration somewhat counteracts the warming effect of

elevated CO2 levels. The quantity, pace of growth, and length of time that carbon is retained in sinks determine how much of an impact this negative feedback has. These factors in turn rely on factors that limit plant growth, like soil nutrient or water scarcity, the pace at which plant matter breaks down, and even the effects of elevated CO2 levels on earthworms (Idso & Singer, 2009; Knorr, 2009 Bast, 2010).

Carbonyl Sulphide

Soils release carbonyl sulfur dioxide (COS), a sulfur gas that is created by biological processes. When COS eventually reaches the stratosphere, it transforms into sulfate aerosol particles, which reduce the planet's temperature by reflecting solar radiation back into space. This is an example of another negative feedback loop in which plants accelerate the release of COS in response to the continuous increase in CO2 levels in the environment. A new study suggests that the COS-induced cooling process might also work at sea since rising temperatures and CO2 levels increase the amount of chlorophyll in surface water. In the meantime, tropospheric COS concentration has increased by almost 30% since the 16th century, according to ice core data. It was 373 parts per thousand (ppt) on average between 1616 and 1694, but it is currently about 485 ppt. Just approximately 25% of this notable rise can be ascribed to human causes (Sciare, Mihalopoulos, and Dentener, 2000; Wingenter, 2007; Bast, 2010).

Diffuse Light

Diffuse light is a third negative feedback phenomenon. Plants emit more gases when CO2 levels are higher because this leads to increased plant productivity. These gases are then transformed into aerosols known as biosols.

The planet cools as a result of biosols acting as nuclei for cloud condensation and forming new clouds that reflect more solar radiation back into space. Additionally, they disperse solar radiation close to the ground, lessen shadows cast by plant canopies, and encourage photosynthesis, which raises the quantity of CO2 that plants are able to take up and store from the atmosphere (Bast, 2010).

Iodocompounds

Iodine-containing vapors emitted by marine algae in the water create particles in the air known as iodinated compounds, or iodocompounds. These materials, like the biosols discussed before, help produce clouds, which reduce the amount of solar energy that reaches the surface. Rising CO2 levels and warmer temperatures encourage the synthesis of iodocompounds, just like they do in biosols (Bast, 2010). Global change-related alterations in the environment have the potential to up the emissions of iodocompounds from marine biota by a factor of five. This kind of shift has the potential to raise global radiative forcing to levels comparable to those brought on by greenhouse gases, but with the opposite sign. Stated differently, it is possible for this biological process to offset the entire warming caused by elevated CO2 levels (Dowd, 2002; Niyogi, 2004; Idso et al, 2009; Bast, 2010).

Dimethyl Sulphide

Sea surface temperature has a direct impact on the quantity of biological dimethyl sulfide (DMS) released by the world's seas; the higher the temperature, the greater the DMS luxury between the sea and the air. A significant source of the nuclei for cloud condensation, which results in clouds with higher cloud albedo, is dimethyl sulfide. More incoming solar energy is

obstructed and reflected back into space the higher the cloud albedo (Dowd, 2002; Niyogi, 2004; Bast, 2010). The 2000 study found that an increase in sea surface temperature of just 1°C was enough to raise the amount of DMS in the atmosphere by 50%. The DMS concentration in the atmosphere would rise by a factor of three or more due to the warming that is normally associated with a doubling of CO2 in the atmosphere. The first warming pulse may be neutralized by this negative feedback (Sciare, Mihalopoulos, & Dentener, 2000; Bast, 2010).

Other Aerosols

Scientists categorize anthropogenic, terrestrial biological, marine biological, and natural non-biological aerosols among the many other types of aerosols. Numerous processes, both biological and chemical, that are typically counter-cyclical to CO2 emissions are responsible for their creation, distribution, or destruction. Stated differently, an abundance of CO2 or a rise in temperature tend to increase the number of these aerosols, which reflects more solar energy away from the surface of the earth and results in cooling. The extensive scientific literature on aerosols is acknowledged briefly by the IPCC (2001), which estimates that aerosols have a negligible net impact compared to CO2. Idso and Singer's 2009 review of the literature, however, reveals that the IPCC's estimate is much lower. Numerous studies show that the total negative forcing caused by aerosols is sufficient to completely counteract the positive forcing brought on by rising atmospheric CO2 (Sciare et al. (2000); Bast, 2010; IPCC, 2001).

Theory of Cloud Formation and Albedo

According to this theory, alterations in these parameters result in adverse feedbacks that entirely or almost entirely counteract the warming effect of elevated CO2 levels. Unlike the AGW theory, this theory is primarily based on observational data from multiple researchers rather than computer models (Spencer, 2007; Lindzen and Choi, 2009; Bast, 2010; Lindzen, Chou & Hou, 2011).

Sud et al. (1999) discovered that the sea surface temperature (SST) in the tropics was naturally regulated by variations in cloud cover, which kept the temperature between roughly 28°C and 30°C. Their work indicates that when SSTs rise, the air at the base of clouds becomes charged with the wet static energy required for the clouds to reach the upper troposphere. At this moment, dry, cool downdrafts encourage the sea surface to cool while cloud cover continues to block out solar radiation from the surface. Sud et al. describe this thermostat-like control. aids in keeping the SST between 28 and 30°C and effectively aerates the tropical ocean.

Lindzen et al. (2001) observed a significant inverse relationship between the upper-level cloud area and mean SST of cloudy regions in the eastern part of the western Pacific after comparing the upper-level cloud data and SST. The area covered by cirrus clouds shrank by 22% for every degree Celsius that surface temperature increased. According to Lindzen's conclusion, the cloudy-humid zone appears to operate similarly to an infrared-adaptive iris, opening and closing the upper-level cloudless parts to enhance infrared cooling and endure fluctuations in tropical surface temperature. Lindzen's calculations show that this negative feedback is so sensitive that in the more realistic

contemporary climate models, it would more than cancel out any positive feedback.

Human Forcing Besides Greenhouse Gases- Theory

This theory of climate change posits that human activity, other than greenhouse gas emissions, is the primary driver of climate change. This influence is derived from activities such as forest clearing, irrigation of deserts, and urbanization. Pielke develops the theory that while there is no doubt that natural factors play a significant role in climate variability and change, human influences also play a significant role. These influences include, but are not limited to, human influence. Carbon Dioxide (CO2) (Taylor, 2007; Matsui and Pielke, 2006; Bast, 2010).

In relation to the theory, cities typically experience higher temperatures than their suburbs, and suburbs experience higher temperatures than rural areas due to higher concentrations of energy-producing machinery and vehicles as well as the abundance of materials used in construction and roads, such as asphalt and concrete, which release thermal energy back into space after absorbing solar radiation (Bast, 2010). Numerous writers have provided documentation of these urban heat island effects In the case of De Laat et al., the Hadley Center/Climatic Research Unit (CRU) temperature trend is most likely to be considerably smaller than the actual global mean surface temperature change, the study's2004 conclusion states. According to this theory, proponents of the AGW theory misattributed rising atmospheric CO2 levels to higher temperatures brought on by urban heat islands (National Research Council, 2005; Bast, 2010).

Other Human Forces Than Greenhouse Gases The theory of climate change also states that concentrations of anthropogenic aerosols and ozone are higher downstream and at source areas because they have shorter half lives than greenhouse gases. According to estimates by Matsui and Pielke (2006), at the regional scale, the effect of human aerosols on the radiative heating gradient is roughly 60 times greater than that of well-mixed greenhouse gases. As a result of their widespread distribution throughout metropolitan and peri-urban areas, surface-based temperature stations are more likely to record the warming impacts of ozone and these aerosols than CO2 (Matsui & Pielke, 2006; Bast, 2010).

The argument states that deforestation, which is common in poor countries, prevents future forest carbon sequestration and releases carbon dioxide into the atmosphere. The agricultural area or pasture that replaces the forest is usually warmer and does not have the same level of shade as a forest canopy. The IPCC (2001) estimates that between 25% and 33% of human CO2 emissions are driven by deforestation rather than the combustion of fossil fuels, a figure that has been questioned as being unduly high.

Furthermore, Human Forcing asserts that human activities in coastal regions—such as forestry, agriculture, building, mining, drilling, dredging, and tourism—have the ability to alter the surface temperatures of adjacent bodies of water, in addition to greenhouse gas emissions. For instance, storm runoff from city streets can dilute seawater and raise temperatures. According to the National Research Council (2005), Travis et al. (2007), and Bast (2010), development can result in the production of silt that restricts streamflow and negatively impacts coral reefs by limiting sunlight penetration or by directly

depositing silt on the coral, causing damage that is mistakenly attributed to global warming.

Theory of Ocean Currents

According to Theory of Ocean Currents, the decrease in the ocean's Thermohaline Circulation (THC) is what has caused changes in global temperature over the last 150 years, especially in the last 30 years. The principal proponent of this hypothesis is William Bill Gray (Gray, 2009; Bast, 2010).

According to the hypothesis, a mechanism known as ventilation continuously moves ocean water from the surface mixed layer into the interior of the ocean. Every 1,000 to 2,000 years, the ocean completely vents itself through the deep ocean subsidence of cold, saline water in the polar regions (the Atlantic and Antarctic) and the upwelling of warmer, less saline water in the tropics. The primary Atlantic Thermohaline Circulation (THC) and the secondary Surrounding Antarctica Subsidence (SAS) comprise this deep ocean circulation, known as the Meridional Overturning Circulation (MOC) (Gray, 2009; Bast, 2010).

The potency of the THC has varied throughout the past millennium, from decadal to multi-century scales, according to paleoproxy evidence and meteorological observations. A little bit more evaporation and precipitation occur in the earth system when the THC circulation is stronger than usual. When the THC is less than usual, global rainfall and surface evaporation both drop by 2% around half the time. This energy depletion during high Atlantic THC conditions not only intensifies the upwelling of deep ocean cold water into the tropical ocean upper-level mixed region, but it also eventually leads to further

upper-level ocean energy depletion and, after a lag of five to ten years, lower ocean surface temperatures (Gray, 2009; Bast, 2010).

Planetary Motion Theory

The second half of the 20th century observed warming may have been mostly caused by the planetary motion theory of climate change, which postulates that the planets' motion through space causes intrinsic gravitational and magnetic oscillations in the solar system. The manipulation of solar fluctuations and/or other extraterrestrial impacts on Earth by these vibrations leads to climate change. The Serbian scientist Milankovitch was the first to propose that planetary motion over several millennia could affect climate (1941). Thanks to new findings, scientists can now monitor these climate shifts precisely.

As stated by Bast (2010), one end of Earth's orbit is further from the Sun than the other, resembling an ellipse rather than a circle. The terms "perihelion" and "aphelion" refer to the planet's closest and furthest approaches to the Sun, respectively. The northern hemisphere's winters are now a little milder because perihelion now takes place in January. Every 22,000 years, perihelion undergoes a temporal shift known as the precession of the equinoxes (Bast, 2010). The eccentricity or form of Earth's orbit varies every 100,000 to 400,000 years due to the gravitational attraction of other planets, particularly Jupiter and Saturn. The ellipse becomes long and narrow, allowing Earth to move both toward and away from the Sun, from being short and wide, which keeps Earth close to the Sun. Furthermore, the Earth's axis tilts upward and downward once every 41,000 years. In general, warmer summers and colder winters are

associated with steeper slopes in the northern hemisphere; cooler summers and milder winters are associated with less slope (Scafetta and West, 2009).

With the aid of favorable climate feedbacks such water vapor, the convergence of these cycles is known to produce cooling and warming phases, which are recognized from historical records as ice ages and interglacial eras. In the study by Scafetta and West (2009), scientists have determined that the precession of Earth's orbit indicates the potential emergence of continental glaciers in around 11,000 years, and that the northern midwinter would occur in July rather than January.

Cloud fluctuations in the planet's movement through space are responsible for climate change at both the decadal and millennial scales. Scafetta suggests that two possible mechanisms may be at work: 1) the differential tidal forces of the gravitational and magnetic forces of the planets on the Sun, particularly Jupiter and Saturn, modulate solar activity and then solar fluctuations modulate Earth's climate; and 2) the different gravitational and magnetic fields created by the movement of Jupiter and Saturn modulate some parameters of the Earth's orbit, for example the Earth's rotation, better known as the length of day (LOD), which then drives the ocean oscillations and, consequently, the climate (Scafetta and West, 2009; Scafetta, 2009; Scafetta, 2010).

Scafetta (2010) explored this theory further by emulating all known and unknown cycles involving the Solar System's natural oscillations using the Sun's velocity in relation to the system's center of mass, or the so-called barycentre. He discovered that the model does a very good job of reconstructing all of the alternating warming and cooling episodes that have occurred since

1860. Next, he applies the model to forecast future climate change; the forecast indicates that a cooling trend may occur by the 2030s. If the quadratic prediction comes true, the temperature is predicted to rise by little more than 1°C by the end of the twenty-first century. According to the model, there are four primary natural cycles that influence the climate: 60, 30, 20, and 10 years. These cycles have a maximum amplitude of approximately 0.3–0.40C throughout a 60-year cycle. According to the National Oceanic and Atmospheric Administration (Scafetta, 2010), this accounted for the majority of the 0.40–0.45°C warming that occurred between 1910 and 1945 and suggests that 60–70% of the warming that was recorded between 1975 and 2002 was a result of this natural climate cycle during its warm phase.

The proponents of AGW theory rely on climate models, which are infamously incapable of accurately capturing historical temperature variations without requiring a substantial amount of data fitting. Without comparable ploys, the Scafetta model accounts for the majority of the warming observed in the 20th century. It is quite evident how different Scafetta's climate forecast is from the IPCC's: Scafetta anticipates cooling over the next 20 years, while the IPCC predicts catastrophic warming (Scafetta and West, 2009; Scafetta, 2010).

Solar Variability Theory

According to this theory of climate change, regardless of greenhouse gas emissions caused by humans, solar variability is primarily responsible for the warming that occurred in the late 20th century and will continue to dominate the climate in the 21st. Sunspot bursts of radiation and energetic particles, which occur roughly every 11, 87, and 210 years, are what cause variations in the Sun's brightness. Earth's climate is influenced by these cycles because they

alter the amount of electromagnetic radiation, also known as the solar wind, that reaches the planet and its atmosphere. The majority of proponents of the theory that the variability of the Sun determines variations in Earth's climate think that positive feedback happens as a result of the solar wind's influence on cosmic rays, which influences cloud formation, or on the ocean's thermohaline circulation (THC), which influences wind patterns and sea surface temperatures.

A radiative forcing of +0.12 [+0.06 to +0.30] W/m2 is estimated to result from changes in insolation since the 1750s, according to evidence for solar variability presented by the IPCC. This is an order of magnitude less than the IPCC's estimate of Net Anthropogenicity Forcing +1.66 W/m2 from CO2 over the same period. The influence of the Sun on global temperatures has historically been ten times greater than that of CO2, according to proxy evidence from ice cores, drift ice debris, and other sources. Despite this, many scientists still think the IPCC made a mistake. According to Bond (2001), during the previous 12,000 years, there have been around 1,500-year cycles in global temperature changes, with nearly every cooling period occurring during a solar minimum.

Svensmark and Friis-Christensen (1997) proposed that within the context of the modulation of cosmic rays by the solar wind, the electrons released into the atmosphere by galactic cosmic rays stimulate the formation of extremely small clusters of sulfuric acid and water molecules, the building blocks of the cloud condensation nuclei. During times of high solar magnetic activity, there are fewer cloud condensation nuclei because of a stronger solar wind that prevents certain cosmic rays from entering the lower atmosphere. Low

clouds consequently develop and lose their ability to reflect light over time, increasing the temperature of the earth and accelerating global warming.

It was discovered by Carslaw, Harrison, and Kirkby (2002) that a solar cycle is associated with a variation of roughly 15% in cosmic ray intensity and a variation of roughly 17% in the quantity of low clouds. This change in clouds is connected with a correction to the earth's radiation budget of about 1 watt per square meter (1 W/m2). Similarly, Shaviv and Veizer (2003) discovered that cosmic ray effects account for two-thirds to three-quarters of fluctuations in Earth's temperature over the previous 500 million years. Taking all of this into account, they assert that doubling the atmospheric concentration of carbon dioxide could only result in a 0.5°C rise in global temperature, which is about the same as the increase noted by many other scientists who are skeptical of the AGW theory.

Regarding the Sun-Arctic interaction, the second school of thought holds that minute variations in solar radiation that penetrate Earth's atmosphere are enhanced by positive feedback involving the movement of energy between the equator and the Arctic through weather patterns and winds. Based on linked air, ocean, and ice feedback that appears to function in broad regions connecting the Arctic and North Atlantic to other sites on time scales of decades to hundreds of years, Soon (2009) contends that the proposed Solar-Arctic coupling loop has strong empirical support.

Concerning the Sun-Arctic interaction, the second school of thought maintains that energy transfer via wind and ocean patterns between the equator and the Arctic results in positive feedbacks that intensify minute fluctuations in solar radiation entering Earth's atmosphere. The proposed Solar-Arctic coupling

loop, which explains how coupled air, ocean, and ice feedbacks function in vast regions that connect the North Atlantic and Arctic to other places over periods ranging from decades to hundreds of years, is supported by strong empirical evidence, according to Soon (2009).

He does, however, issue a warning, saying that his proposal should only be viewed as a first step in a lengthy quest to comprehend how climate changes over time and the function of solar radiation. According to certain theories, variations in seawater production in the North Atlantic are caused by solar variability, which modifies the worldwide oceanic thermohaline circulation (Bast, 2010).

These theories are intended to aid in evaluating the relative contributions of natural and human-caused climate change. Students will be able to develop strong solutions to Ghana's and the world's climate change problems by being helped to comprehend this. The researcher was able to place the study's findings in the perspective of a broader body of knowledge about how well high school social studies curricula meet the challenges brought on by climate change.

Social Reconstructionism/constructionism

According to the educational theory known as social reconstructionism, schools should be used as a tool to address societal issues. Theodore Brameld (1904–1987) was this philosophy's most well-known proponent. According to Webb et al. (2010), all leaders are products of education, and as such, curricula should be provided in schools to aid in their growth. Students that actively participate in the learning process are encouraged to learn through a participatory approach, which is supported by constructivist teaching and learning theory. Students who want to be change agents need to look at societal

inequalities and come up with solutions. To further elucidate on this point, Sadker and Zittleman (2010) assert that education ought to motivate educational institutions, instructors, and learners to focus their studies and endeavors on mitigating existing socioeconomic inequalities, with the ultimate goal of rebuilding society. Its goal is to reconstruct society into a more equitable and better social structure, as suggested by the name. Moreover, social reconstruction classes emphasize critical theory and the curriculum's focus on the development of critical literacy or critical thinking skills (Webb et al., 2010).

According to von Glaserfeld (1989), constructivism upholds the following two concepts as a philosophy of knowledge: Hence, rather than seeking an ontological reality, cognition plays an adaptive function in structuring the empirical world (Von-Glaserfeld, 1989). In addition to imparting cognitive knowledge, social sciences foster the growth of positive attitudes and values that can be used to address both individual and societal issues (GES, 2010). Socioeconomic difficulties can include environmental challenges, such as climate change. Reeves (2013) claims that the reconstructive classroom program made students feel things, brought attention to social injustices, strengthened their ability to think critically, and motivated them to act to improve their society.

According to Dewey's (1897) theory, pupils who are in a rich environment and have opportunities for social interaction are more likely to study well and have a strong tendency toward learning. Through their environment's reactions, students make connections between school activities and social meanings and educational worth. Dewey encouraged instructors to

develop curricula so that pupils might learn as a community in which they worked with their teachers and one another. Social interaction and a nurturing learning environment are essential for students to learn, according to Vygotsky (1978).

In comparison to learning in a non-supporting setting, the learner can achieve a better level of skill mastery when in a supportive environment. According to Vygotsky, educators should create curricula that support strategies that instructors might employ to help students internalize the material in a way that fosters more mature thought processes. Teachers will be able to better identify their students' learning levels and devise strategies for extending their education as a result. He continues by saying that students want a setting that enables them to discuss and exchange the different issues they run into during studying. He uses the Zone of Proximal Development (ZPD) in this context to describe how different learners can have different levels of proficiency in learning about a given event. There are two levels in this zone: lower and upper. He said that a student can do things on their own in the lower zone, things they cannot do on their own in the upper zone, and things they can do with the assistance of others in the upper zone. One way to think about the process of assisting students in acquiring knowledge in a rich environment is as a scaffold attempting to reach a tall roof.

Social Efficiency theory

In the words of Schiro (2008), the ideology of social efficiency in relation to education policy initially surfaced in the early 20th century writings of scholars like Franklin Bobbitt (1918) and had its greatest impact on education

in the latter part of the century. It appeared when the US adjusted to quickening urbanization, rising immigration, and industrialization.

It was motivated by the theory that a significant section of the population had turned away from traditional communities and social groups. Social efficiency educators argued that the nation's legal system should be upheld by the educational system. They assigned the schools the responsibility of creating a curriculum that would restrain egotistical goals and tendencies that could lead to the breakdown of society.

Snedden (2013) defines social efficiency as an educational philosophy that holds that in order to mold a person into the ideal social attributes, knowledge, attitudes, and abilities must be directly imparted. According to social efficacy theories, society is enhanced when its individuals become more socially and professionally helpful. Snedden also recommended that a concentrated effort be made to ascertain each person's prospective place in society and to design a curriculum that is especially suited to nurture that person's full potential. The goal of social efficiency is for educators to assist learners in acquiring the competencies required to fulfill the demands of the community. In this perspective, the difficulties posed by climate change are the demands of society. In this context, students are viewed as future contributors to society with the abilities to apply what they learn in the classroom. The capacity of kids to fulfil societal demands is emphasised.

This school of philosophy holds that educators should put more of an emphasis on assisting students in acquiring social skills. teaching students about social studies concepts to better equip them to deal with the effects of climate change. Social efficiency assumes that satisfying social demands is learning's

main goal. It should be possible for teachers to adapt the curriculum to suit the requirements and interests of their students. Students will get the ability to make meaning and the knowledge necessary to actively engage in a democratic society as a result (Schiro, 2008).

Teachers that subscribe to this ideology see the curriculum as a tool that enables students to become active members of society, which supports the notion that schools are locations where students are prepared to meet societal requirements (Schiro, 2008). Schiro claims that scientific instrumentalism is the main cause of the concern for social efficiency, with teachers developing curriculum that is scientifically designed to meet societal expectations. It is therefore up to curriculum designers to identify society's needs and then develop a curriculum that meets those specific needs (Schiro, 2008). Teachers must also find the most effective methods of transmitting their inherent knowledge to students in order to produce educands who meet the objectives of the developed curriculum and respond to the needs of society.

These theories serve as the primary foundation for this investigation. With understanding of their society's values, issues, way of life, and aspirations for the future, people are better equipped to integrate into society as part of the GES (2010) Social Studies curriculum. Climate change is one of the issues that civilization is confronting. The study of social studies as a subject aids student in creating a critical yet evolving mind that has the power to change society by helping them to analyse how their society functions (GES, 2010).

Social reconstruction theory is the foundation of this study because in Social Studies, students are encouraged to interact with each other to share information, and teachers are expected to create a supportive environment that

facilitates learning by serving as a guide (GES, 2010). Once more, according to the GES (2010) Social Studies curriculum, teachers should make use of the students' surroundings to enhance the subject's teaching and learning. Again, the notion promotes socially engaged pupils by instilling a feeling of accountability for the welfare of society. In the context of climate change, this translate to empowering Social Studies students at the SHS level to take actions, advocate for sustainability practices, and contribute to positive environmental changes. Furthermore, Social Studies students can learn the benefits of collaboration, teamwork, and collaborative problem-solving with are crucial skills of the 21st century. These skills are crucial in addressing social and environmental issues and working together towards solutions in areas such as climate change. Lastly, when SHS Social Studies students engage in observational learning and analyse their behaviors within the social context, they can develop critical thinking skills. They learn to evaluate information, assess consequences of their actions regarding environmental issues including climate change and hence, the choice of this theory.

Conceptual Review

Concept of Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) (2004) defines climate change as any modification of the composition of the Earth's atmosphere brought about by human activity that surpasses naturally occurring climate variability that can be seen over comparable time periods.

Any change in the climate over time, whether brought on by natural variability or human action, is considered climate change, according to the

Intergovernmental Panel on Climate Change (IPCC, 2007). The same body asserts that it is a man-made and natural phenomenon that harms the ecosystem and casts doubt on the survival of all living things. The phrase "climate change" refers, according to Medugu (2009), to an increase in the average world temperature that is assumed to be caused by both natural disasters and human activities. He went on to say that climate change carries the potential to upend all human and environmental systems and to endanger the social, political, and economic advancement of humanity.

An important aspect of climate change is that whichever way one looks at it, it is a permanent event that significantly hinders progress in the 21st century. The best way out is to find ways to raise awareness of it and its negative consequences by communicating it through relevant content from experts and Social Studies offers the best platform for this.

Climate change is one of the most important challenges of our day, according to UN Secretary-General Ban Ki-moon (UNESCO, 2010, p. 2). In his opinion, everyone can contribute to the global effort to combat climate change. The gradual discharge of greenhouse gases into the sky is destroying the ozone layer that once protected Earth. Due to its numerous interconnected issues, including poverty alleviation and economic development, climate change is a complicated worldwide problem. Climate change is a phenomenon that has captivated the attention of humanity due to the destruction it brings about.

Causes of Climate Change

As demonstrated by "the geological evidence of ice ages and sea level changes as well as the record of human history spanning many centuries," the earth's temperature has altered dramatically throughout time. For a considerable

amount of time, scientists have understood that increases in atmospheric greenhouse gases will cause further warming since these gases function as a blanket, absorbing solar radiation and maintaining the Earth's surface warmer than it otherwise would be (UNISDR, 2009).

The majority of individuals are aware of the causes of climate change and acknowledge that it is a man-made issue (DEFRA, 2002). When questioned, the majority of individuals can accurately name the following as causes of climate change: power plants, carbon dioxide emissions, transportation, and deforestation (DEFRA, 2002; Hinds et al., 2002; Bibbings, 2004; BBC, 2004). Regarding this assertion, some scientists have commented (Paehler, 2007 being one example) and said that there are two types of explanations for climate change: natural causes and human-caused causes. Natural variability and fluctuations in the climate system caused by climate change are part of the Earth's history; however, in recent years there have been changes in the concentration of greenhouse gases in the atmosphere that have increased at an unprecedented rate and magnitude (Paehler, 2007).

Despite some disagreement in the past, most people agreed that human activities—especially the use of fossil fuels and changes in land use—are the main causes of this growth and the majority of the warming that has been seen over the past 50 years (UNISDR, 2009). The IPCC (2018) discovered that greenhouse gases, primarily from human activity, are the primary contributors of climate change. They also emphasized that 50% of the extra global greenhouse effect caused by humans is attributable to the usage of fossil fuels like coal, oil, and gas for energy. The devastation of forest ecosystems, which is crucial for removing carbon dioxide from the atmosphere, makes the issue

worse. Larger amounts of these emissions are due to the pursuit of industrialisation and urbanization, which are the initiating cause of increased energy demand and their associated impacts.

According to the Intergovernmental Panel on Climate Change (IPCC, 2018), there is a clear human influence on the global climate based on the data now available. Humans contribute to global warming, particularly through deforestation and the release of fossil fuels into the atmosphere. Fossil fuel emissions result from fuel consumption in automobiles, power plants and industry. These emissions are called anthropogenic emissions to indicate their human origin. Paehler (2007) argues that all people engage in activities that contribute to emissions. However, it is fair to observe that the proportion of the contribution depends on the level of industrialisation of each country. If human activity has a significant role in contributing to global warming, then altering human behavior is necessary to reduce emissions. It is this fact that puts education at the heart of the climate change debate and hence, Social Studies education.

Obeng (2012) asserts that human activities like burning fossil fuels—particularly petroleum products—in automobiles, generators, and other industrial gear are what cause climate change. He went on to say that there has been a remarkable surge in the quantity of automobiles in urban areas, with a large proportion being imported vehicles. Additionally, the use of generators has increased as a result of frequent power outages and insufficient electricity supplies, particularly in several African countries. High smoke production has raised carbon dioxide levels due to the growing quantity and use of cars and generators, as well as the owners' inadequate maintenance skills (Obeng, 2012).

Once more, burning woods carelessly for agriculture and hunting has increased carbon dioxide concentrations and damaged plants and trees that depend on it, which has led to the generation of greenhouse gasses (Obeng, 2012). In extreme cases, illegal mining has led to the extinction of local water sources as well as poisoning of the land and water. This has affected the pattern of rainfall. Moreover, the negligent elimination of waste has led to the demise of marine organisms, the degradation of land, and the enormous emission of methane gas (CH4) into the atmosphere.

Effects of Climate Change

The atmosphere is constantly polluted by carbon emissions. Projections show that there will be a sudden rise in temperature, melting glaciers, and flash floods due to the destruction of the ozone layer (Schandl., et al. 2016). However, air temperatures are rising every day, contributing to global warming (Owusu & Asumadu-Sarkodie, 2016). The agricultural sector is suffering from global warming, which is having a major impact on the international economy. On a global scale, land and sea temperatures are rising. This poses a high risk of coastal erosion and damage to aquaculture (Rogelj., et al. 2016).

Climate change is currently altering the amount and pattern of precipitation, leading to unexpected changes in the timing of rainfall. Some parts of the world are experiencing extreme droughts and floods due to climate change. Experts warn that coastal cities need to be on heightened preparedness in view of rising sea levels (Gulagi, Bogdanov & Breyer, 2017).

Social Studies Students and Climate Change Education

Students and their teachers are seen as important change agents in this approach, as they are multipliers of knowledge and action (Stevenson et al.,

2017; Andersen, 2018; Kuthe et al., 2019). Thus, students can significantly impact their families' energy-saving behavior (Andersen, 2018; Brennan, 2019) and serve as multipliers of climate change knowledge (Kuthe, et al. 2019).

To begin with, one must comprehend the significance that educators and students attach to climate change. Research frequently concentrates on people's knowledge of climate change. Prior to creating teaching materials and providing professional development for educators, Dawson (2015) conducted a study in Western Australia with 438 Year 10 high school students to ascertain their understanding of climate change. Just one out of every three pupils were able to define the greenhouse effect and climate change, either fully or incorrectly. These findings, however, only highlight a portion of the educational difficulty associated with pupils' comprehension of climate change.

Compared to other studies, people's perceptions and opinions fluctuate depending on their worldview, wealth, gender, place of residence, and cultural influences (Kahan et al. 2011). These factors, which include remote effects both geographically and temporally, powerful self-interest, delays or lack of satisfaction for action, and invisible causes that typically do not directly affect human health or well-being, add to the difficulties in developing an understanding of anthropogenic climate change (Moser, 2010). To put it briefly, it is challenging to comprehend and formulate a personal understanding of climate change (Nicholls, 2016).

Social Studies Teachers and Climate Change Education

Teachers' understanding of the debate on climate debate is strongly influenced by social, historical, cultural, and political contexts. The increased emphasis on potentially controversial topics makes Social Studies teaching

particularly vulnerable to censorship, as it is often exposed to political and social influences (Nelson & Ochoa, 1987; Parker, 2010). As a result, teachers tend to avoid controversy by censoring themselves (Nelson & Ochoa, 1987). It is also important to assess the impact of teachers' views on controversial issues, as well as their understanding of the main cultural barriers to teaching controversial topics like climate change.

Stevenson et al. (2013) note that there have been varying interpretations and observations regarding the goal and reach of this kind of education in their assessment of education and the environment and/or sustainable development (Smith, 2013). In general, education for sustainable development is used to define and analyze climate change education. The goal of the subject and its consequences for educators' tasks are among the primary considerations of the Centre for Education for Sustainable Development and Climate Change.

Furthermore, addressing contentious problems and concerns in the classroom presents major psychological and emotional challenges for instructors (Weinstein, 1990; Oulton et al. 2004). Research has indicated that educators' conceptions of the nature and goals of climate education impact the method in which they instruct it. For instance, the findings of a study involving three geography teachers in the UK revealed that these instructors did not share the socio-cultural goal of teaching about climate change as stated in the National Curriculum (Cotton, 2006). Rather, the trio of educators suggested adopting a neutral and impartial approach towards contentious environmental matters. Brooks (2006, 2010) also suggested that teachers' appreciation of climate related issues are influenced how they designed the curriculum. Teachers' beliefs are crucial as they have a significant impact on their teaching

practice (Hess, 2009) and can guide activities or act as a filter for pedagogical judgments (Fives & Buehl, 2014).

Additionally, instructors' decisions on the curriculum are greatly influenced by the schools. Instructors frequently voice concerns about curricular goals not being accomplished, the difficulty of teaching these contentious subjects, and the lack of time that makes it difficult to keep the classroom orderly (Bickmore, 2002; Misco, 2011). Education about climate change is greatly impacted by school architecture as well as subject matter and organizational strategies. For instance, the multidisciplinary approach that supports climate change education conflicts with the discipline-based curriculum (Gayford & Dillin, 1995; Corney & Reid, 2007; Stevenson, 2007). This is due to the fact that proponents of climate change education argue for an open-ended, diverse, and deliberative investigation into environmental philosophy, values, and ethics (Olvitt, 2013), as well as the growth of students' political advocacy abilities and politico-legal process understanding (Stevenson, 2007).

Teachers can be seen as a second type of strategic information multiplier when it comes to change agents (Schelly et al., 2012). Teachers can be seen as authoritative role models involved in climate change mitigation and, in particular, they play a key role in personal action on climate change (Skamp et al., 2013). However, research on knowledge and understanding of climate change has shown that teachers, like their students, often have an inadequate or scientifically incorrect understanding of key climate change concepts. Common misconceptions in all three cohorts included, for example, mixing weather and climate or attributing climate change to ozone depletion (Plutzer et al. 2016).

The conceptual framework (Curriculum Adequacy) for the study is presented in figure1 in the subsequent paragraph. The framework (Curriculum Adequacy) gives a visual representation of the study highlighting and connecting the five research questions driving the study. Details of the framework is presented in figure 1.

Conceptual Framework

Figure 1

Curriculum Adequacy Framework

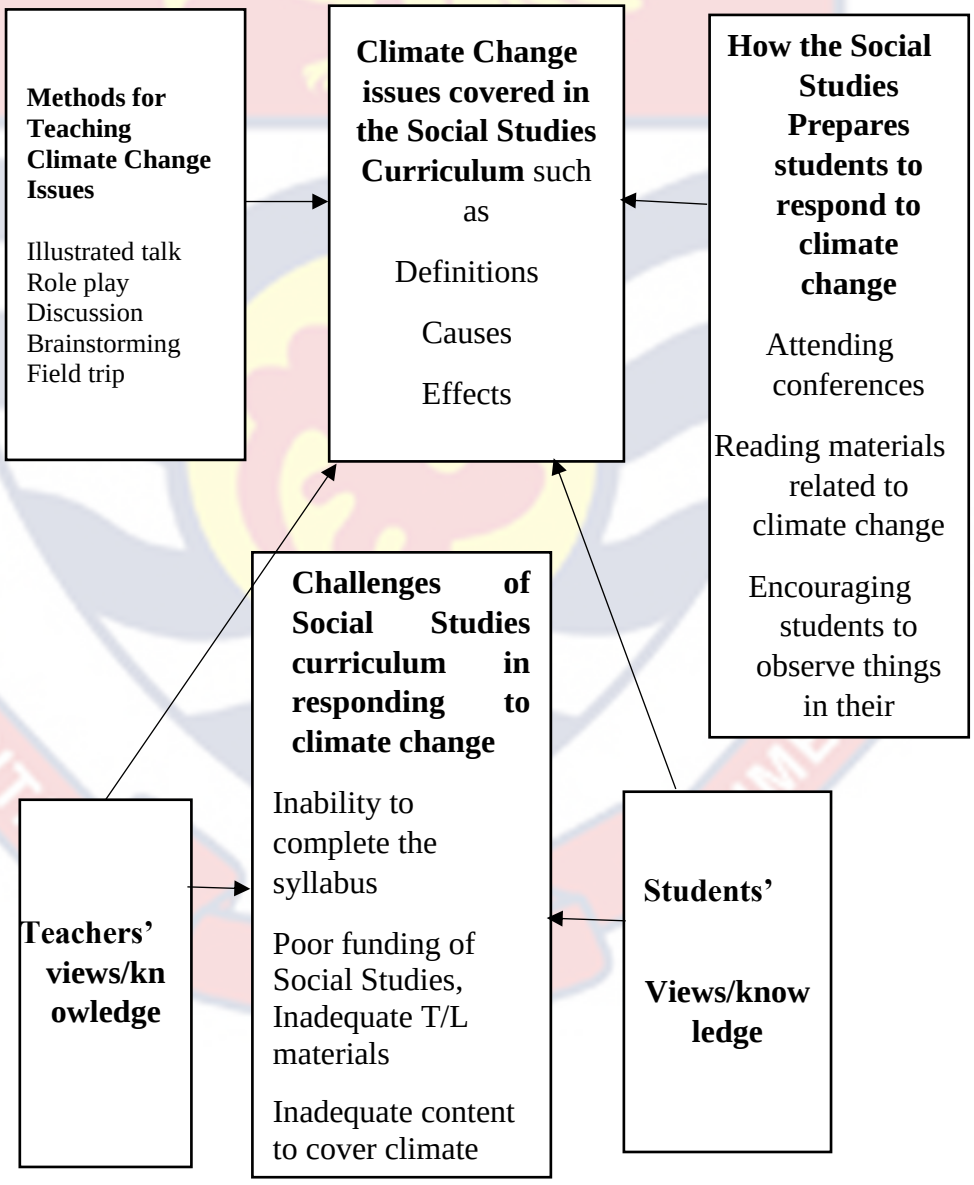

Figure 1: Conceptual Framework
Source: Author's own construct

Figure 1 illustrates the climate change issues addressed in the SHS Social Studies curriculum. Topics such as the definition, causes and effects of climate change are dealt with. The framework also explains how Social Studies education helps students respond to climate change. This is demonstrated by providing reading material, encouraging students to observe things around them and encouraging them to attend climate change conferences. This will help to adequately prepare students to respond positively to climate change. The framework also addresses Social Studies teachers' and students' awareness of climate change issues such as definition, causes and effects. Here, too, methods such as illustrated lectures, role-plays, discussions, brainstorming and field trips are used in teaching about climate change. With regard to the views of Social Studies teachers and students on the challenge of Social Studies education in response to climate change, issues such as teachers' inability to complete the curriculum, poor funding of social studies education, inadequate teaching and learning materials and poor treatment content climate change issues include the major challenges.

Adequacy the SHS Social Studies Curriculum Covers Climate Change Issues

The problem of climate change still exists even with Social Studies curricula that teach about it. As components of Ghana's common core curriculum, subjects like Social Studies and Integrated Science have a connection to climate change and have the potential to significantly influence the discussion of climate change at the Senior High School (SHS) level. The three-year Social Studies curriculum in Ghana is split into three main categories: 1) The natural world; 2) Political and governmental stability; and 3)

Socioeconomic Advancement. Among the subjects covered in the third year under the general category of Environment are the Ecosystem, Physical Environment, and Human Activities; the Influence of Climate; Rainfall; Land and Environmental Degradation; The Green House Effect; Mining Challenges; and Environmental Conservation (GES, 2010). One unit (2 percent) of the SHS integrated social studies teaching syllabus's total content is devoted to the topic of climate change. It was covered in SHS 3's "our physical environment and environmental challenges" theme. Even if the effects of climate change are covered in class, there doesn't seem to be any more discussion of the problem in social studies, and there doesn't seem to be any continuity in subsequent years. Furthermore, the third year in which certain components of climate change are taught is an examination year, during which the students' attention and time are consumed by six or seven other courses that must be passed in order for the students to advance to the next step of the educational ladder.

Once more, the West African Secondary School Certificate Examination (WASSCE) begins in the second half of the academic year, hence the third year is not a full academic year. The Integrated Science curriculum addresses topics like ecosystems, human activities and their effects on the atmosphere, major sources of air pollutants and their effects, greenhouse effect, climate change, desertification, drought, melting ice and polar ice caps, rising sea levels, causes and effects of ozone depletion, and tectonic movements. Climate change is also covered under the topic of Interaction of Matter.

Although there seems to be evidence that students are being introduced to climate change issues at this level, the challenge is that there is minimal deepening of the issues covered in subsequent academic years. The cessation

and under-reinforcement of climate change-related issues in the Social Studies curriculum at the SHS level is, according to the researcher, a concern for both educators and the general public and something that policymakers and curriculum developers need to address.

Social Studies Teachers' and Students' Level Knowledge on Climate Change

Knowledge about climate change can lead to despair, leading to a gloomy attitude towards the future and ultimately failing to mitigate climate change (Ojala et al. 2019). Teachers' and students' knowledge of climate change and the challenges it presents helps maintain problem-focused coping practices because people know what they can do (Ratinen et al. 2020). He adds that knowing about climate change is helpful in choosing appropriate strategies. An inaccurate scientific understanding of climate change could lead to denial or lure those who lack sufficient climate change knowledge to an alternative truth. Global problems like climate change, which have far-reaching implications for the survival of humanity on this planet, require more attention in the search for knowledge. It is expected that more information from curriculum coverage will increase public awareness of such a critical global issue.

Therefore, climate change is an issue that requires close attention from scientists, policy makers and the public; as a result, there has recently been a great deal of interest in educating the public about climate change and educating students, the future citizens, to successfully deal with this threat (Papadimitriou, 2004). It is expected that teachers will play an important role in helping society to understand the challenges of climate change. Teachers can only do this effectively if they are well versed in the subject and the challenges involved.

In a study by Savaşçı-Açıkalın and Açıkalın, (2011) it was reiterated that teachers are the second influential personalities, especially in educating people on climate change. Understanding anything in our daily lives necessitates understanding how it emerged and developed, as well as how it fits into the greater context or system of which it is a part. Dewey believes that teachers must be students of both subject matter and "mind activity" in order to assist student advancement (Ross, 2015). Teachers who have learned to apply critical thinking to their work are needed in the teaching profession. To do so, they must be well-versed in their subject matter and be able to monitor and reflect on their practice.

Scholars and other academics who are interested in understanding and describing the knowledge and thinking that support instruction have focused on a range of issues and brought different perspectives to this complex area. Many of these studies delved into three interconnected questions: What knowledge is essential for teachers to possess? How do teachers acquire this knowledge for their lessons? And what cognitive processes guide teaching? These questions, explored by Gage in 1978, are fundamental to understanding the relationship between teaching methods and teachers' thoughts, knowledge, and beliefs.

Climate change is one of the world's greatest challenges, placing a significant strain on societies and the environment. From changing weather patterns that threatened food production to rising sea levels that increased the risk of catastrophic floods, the impacts of climate change are global and unparalleled in its magnitude. Without drastic action today, adapting to these impacts will be more difficult and costlier in the future (UNEP, 2009). This has

prompted scientists, researchers, educators, policymakers, and governments to give this global phenomenon the attention it deserves.

This implies that education would play a crucial role in providing people with knowledge and understanding, and in helping individuals, society and governments make informed decisions so that humanity could respond to the problems. It is about more than just informing people; It is about mobilizing education, especially schools, to align society with sustainable practices. This will result in an adaptation need, which is defined as any effort aimed at adapting to predicted or actual climate change conditions. This is strongly influenced by the Social Studies teachers level of understanding of climate-related issues.

In the initial part of the 20th century, there were not many issues with the type or quality of instructors' knowledge. It is required of teachers to be knowledgeable about pedagogical practices and to have a solid understanding of the subject matter they are teaching (Gage, 1978). Shulman (1986) made a strong case for the significance of teachers' subject-matter expertise and sparked interest in the methodical investigation of the knowledge behind instruction. He views teaching as a challenging profession requiring a broad variety of expertise. Certain knowledge, like subject-matter knowledge or fundamental educational ideas, is broader and more durable.

Others, including knowledge about the specific student being taught and the events of a certain class, are more specialized and fleeting. Teachers are thought of as the link between education and the next generation of learners and citizens. The attitudes of children toward their environment are positively correlated with instructors' awareness of climate change (Sanders & Rivers,

1996; Westerlund, 2002). Students will learn more about climate change from teachers who are more knowledgeable about it. Numerous researches have examined the relationship between students' learning results and the methods used in their instruction (Papadimitriou, 2004).

Methods used in the Social Studies Curriculum

Some researchers use “methods” and “strategies” interchangeably, but they are not synonymous. Melinger (1981) defined strategy as a teacher's general approach to directing education throughout time, whereas methods are particular kinds of instruction. The Africa Social Studies and Environmental Studies Programme (ASESP) defines strategy as the order in which a skill is taught throughout a class period, while method refers to the overall approach to teaching. The excerpts demonstrate how teaching social studies demands a high degree of pedagogical expertise. In the words of Byrne (1983), "insofar as a teacher's knowledge provides the basis for his or her effectiveness, the most relevant knowledge will be that which concerns the specific topic being taught and the relevant pedagogical strategies for teaching it to the specific types of pupils to whom it will be taught" (p.14).

Byrnes' assertion that successful pedagogical strategies that interact with the subject matter to either increase or diminish teacher effectiveness are more important for learning than topic knowledge is clear from Darling-Hammond (2000). It goes on to say that instructors' generally positive attitudes foster good teaching and learning. Therefore, a teacher's ability to understand a variety of ways and strategies is critical to their effectiveness as educators.

As stated by Ross (2015), when we see Social Studies teaching and learning as activities in which we need to confront and examine in order to

understand and better our environment, the limitations of an ends-means approach in the curriculum become evident. A policy-mandated to-do list or a test or exercise should not be the whole of social studies instruction. Teachers ought to actively consider curriculum-wide problems instead, like what material is most important. Learning social studies should focus on helping students gain a personally relevant grasp of how the world functions and how they may act to alter it, rather than just passively absorbing other people's perspectives. Teaching and learning in the Social Studies should focus on identifying and examining the parts of our daily lives that we take for granted (Ross, 2015).

In the words of Aggarwal (1982), effective Social Studies instruction and instruction on climate change issues should foster a love of learning and a drive to work as hard and efficiently as possible. Students should also be given plenty of opportunities to participate in class and, among other things, hone their critical thinking skills.

Tamakloe (1991) also mentioned that a teacher needs to have a working understanding of multiple disciplines and be comfortable with the use of various teaching tactics and methodologies in order to teach social studies. Effective learning cannot occur without skilled social studies instruction, as stated by Banks (1995), who effectively summarises the situation. This prompted MOE (2010) to delineate some techniques to be employed in the SHS Social Studies curriculum. These variations in opinions has compelled Siegner, (2018) to suggest that many authors have debated the importance of teaching methods not effectively communicating the issues of climate change, which could lead learners to take climate action. Because the goal of teaching climate-related issues goes beyond providing information to students. In order to promote a

healthy teaching environment, teachers should use the best opportunities to present climate change content in a lively manner. This leads one to the conclusion that effective teaching approaches have a bigger influence on teachers' overall pedagogical approach. The paragraph that follows goes over a few of these techniques.

Discussion

Discussions are a great method to get children excited about the material they are going to learn. This type of instruction involves the instructor posing a series of pertinent questions to the class, encouraging them to voice their thoughts and opinions on the subject matter under discussion. Because it suggests that everyone may contribute in a positive way to the educational endeavor and because it asserts that learning occurs when students actively participate, Brookfield (1991) characterizes the conversation as both inclusive and participatory (p. 14). In accordance with Arends (1998), students and professors must converse during discussions. Students are expected to use academic resources to engage in discourse and conversation. and it is required of students to put their thinking into practice and share it with others (p. 352). As stated by Brookfield (1991), the goal of debate is to influence students' perspectives in a way that teachers find desirable (p. 189). This is true and is best suited to Social Studies classes, which are full of controversial issues.

Role Playing

Role playing is one technique that can be used to teach social studies subjects. Role play, according to Clark (1973), is an attempt to use improvised dramatization to explain an issue or find a solution (p. 73). Shaftel and Shaftel (1982) describe role-playing as a group problem-solving method that lets young

people explore human problems through impromptu enactments and the supported conversations that follow (p. 9). On the other hand, role-playing is described by Mellinger (1981) as organized exercises that let students put themselves in the shoes of a character and act out an imaginative scenario as authentically as they can. Then, role play might be defined as impromptu action performed from within a scenario to depict people's emotional reactions in an actual scenario. Using it in the classroom is to teach students to solve problems effectively by selecting social problems for their study (Martorella, 2001).

Simulation

In order to help teenagers' grasp the actual situation, children reenact a created scenario that resembles a real-life incident, as per Clark's (1973) theory of simulation, which blends role-playing and problem-solving. As a result, the simulation is a representation of the real world. According to Giley (1991), simulation is a tactic that lets students gain knowledge, abilities, skills, or behaviors by putting them in authentic settings. Role-playing games and simulation are closely connected concepts. The definition of simulation is acting out or copying ASESP (1994). They went on to say that occasionally simulation is involved in a made-up event that has rules (p. 16). According to Martorella (1994), simulations are frequently referred to as simulation games because they are based on gaming techniques. So, a business game combines simulation and gaming, allowing students to step into other people's shoes and make their own decisions. Because they are now active learners rather than just passive recipients of the instruction, the students are less reliant on the teacher.

Brainstorming

According to Omane-Akuamoah (2004), actual brainstorming is a technique for generating ideas or different solutions to a problem. The researcher identified the phases of a brainstorming session as follows. The session should start with identifying the problem that needs solutions so that all members of the group are clear about what type of ideas they are trying to generate. The next step is the actual brainstorming, where the teacher or group leader suggests comments or ideas and captures them on the blackboard or overhead projector as quickly as possible. All ideas are recorded, regardless of where they come from, how silly or inappropriate they seem, or whether they've already been suggested. There will be no discussion or clarification. This phase continues until all concepts are exhausted. The third phase is called review, where each suggestion is scrutinized so that everyone understands what the suggestions made really mean. A decision is then made as to whether the proposal remains on the list for further debate or is discarded. The aim is not to judge whether the idea is excellent or bad, but rather whether it is worth discussing. One reason for discarding suggestions is repetition of concepts. The final phase is the round table, where the remaining ideas are reviewed to determine which recommendation to accept and develop further.

Project Method

The project technique is also necessary given the variety of approaches used to teach Social Studies. The programme was integrated into the curriculum to teach students how to work independently and connect theory and practice in the classroom. It started with the professionalization of occupation. It is believed to be a means for students to develop independence, responsibility,

and social and democratic behavior patterns (Knoll, 1997). As stated by Kilpatrick (1925), a child's project is everything they do with intention; anything they do with heart is a project. As per the definition given above, a project is an activity that is focused on the child and is completed by students in order to accomplish a particular goal. Individuals or organisations utilise the project approach to conduct independent observations or other types of research to help solve problems. Students understand the significance of the problem that needs to be solved in this way.

A local study, in which students are tasked with conducting research and writing a report about their neighborhood, may be a part of the project approach used in Social Studies instruction. The report could be worked on cooperatively; possible subjects to look up in their town include the location, occupation, and festivals. Each group submits a report after presenting its thoughts. There are numerous advantages to the project technique. It assists in managing pupils with varying skill levels. One benefit of project work is that, by combining group and individual tasks, pupils of greater ability can assist those of lower ability, which benefits both. A strong writer in the class can assist a weaker writer with editing and revisions, integrating the learning process (Glaser & Brunstein, 2007). On the other hand, the students develop skills for the analysis and formulation of hypotheses in the project work; this gives the student a logical understanding of the problem or issue to be solved.

Lecture Method

Lectures, the most commonly used teaching method, have dominated formal education over the years. Different kinds of African study indicate that social studies teachers apply the same explanatory, teacher-centered techniques

for teaching geography and history, according to Merryfield and Muyanda-Mutebi (1991). According to Vella (1992), a lecture is an official presentation of material by a teacher intended for pupils to learn and retain in preparation for tests. According to Lyule (1995), a lecture is an oral presentation of instructional material.

Bligh (2002) explains the findings of the lecture method effectively by implying that the evidence in the lecture method corroborates this conclusion. Deliver information through lectures. You shouldn't depend on them to alter your way of thinking, your attitude, or your behavior (p. 20). It is clear from Bligh's assertion that the goal of a lecture is to quickly and efficiently impart knowledge to a broad audience. Since it enables the presentation of the greatest number of materials, it is primarily employed to cover a specific amount of content. Typically, it is characterised by one-way dialogue. The instructor presents ideas or concepts, and the pupils listen and take notes.

Resource Persons

A community's most valuable resource is its people. There are people in the community who have special skills that can be used to help students. Someone who is knowledgeable or skilled in a specific field of study or experience and who is not your standard class or topic teacher is known as a resource person. They may be asked to assist with learning. As a result, it is assumed that the resource person has greater expertise in their specialty than the instructor. One may choose to hire a social studies instructor from within the community or from outside Among those invited are police officers, doctors, nurses, and community leaders. Melinger (1981) suggested that these folks might be invited to speak as guests. The teacher might not immediately

grasp the subject topic, which creates a requirement for a resource person. Because facilitators break the teacher-student relationship, they improve the learning process.

Fieldwork

Fieldwork is defined as teaching and learning that occurs outside of a classroom or laboratory. It is typically scheduled and organized to occur in a school setting, in the local community, or outside of it. Field work is referred to by several names. Field trips, excursions, study tours, and educational walks are words used by Kilpatrick (1925). Kilpatrick refers to his fieldwork as "excursions," however this phrase actually refers to an instructional stroll rather than a tourist excursion, where the goal is to impart pedagogical content to learners.

Pre-fieldwork, pre-fieldwork, and post-fieldwork activities are the three stages into which fieldwork activities can be divided. The goals and extent of the job to be investigated determine how long the fieldwork will take. The phenomenon being studied could be significant from an economic, historical, geographic, or cultural standpoint. The benefits of fieldwork include teaching students how to solve problems and think critically, how to work in groups, and how to locate and analyze material from books and other sources. According to Anderson and Piscitella (2002), field trips leave a lasting impression on students, usually involving recollections of particular social settings and subject matter. Field research projects are essential to the success of social science education.

Field trips are organized outings outside of the classroom with the aim of gathering information and offering a chance to witness phenomena up close,

according to Tamakloe (1991). Because of this, Hayford (1992) acknowledges that the nature of the educational process should allow the learner to collect data from both their immediate and surrounding environments. Fieldwork is seen by Hayford and Tamakloe as a crucial teaching and learning tool in social studies. The researcher's observation serves as a reminder to educators to distance themselves from scenarios in which instructors and pupils are confined to the classroom's four walls.

Trott (2017) identified three key approaches that can be used when teaching climate change issues to make children more receptive to its challenges. These include transformative, arts-based and participatory approaches. He went on to say that instructional literature, which emphasizes powerful pedagogical techniques to enhance student learning, is the most often utilized method in the field of education to teach concerns related to climate change.

Transformative Approaches

Transformative approaches are those that teach children to be active citizens in the now as well as for the future. These transformative frameworks, including Education for Sustainability and Climate Education to Empower, go beyond the traditional perspective of scientific literacy and highlight the social, ethical, and political dimensions of climate change while encouraging varied engagement and action for social change. Take the 3-H model proposed by Sipos, Battisti, and Grimm (2008).

Arts-based methods: Facilitating meaning-making

Oppressed communities have traditionally used art to encourage critical group discussion and action for social change, as well as to reject and rewrite

dominant cultural myths and raise social consciousness. Furthermore, youth engagement in civic activities within their communities has been fostered through the implementation of arts-based initiatives (Dewhurst, 2011). Decision-makers can become more aware of climate change and be encouraged to advocate for change on behalf of their communities by facilitating creative, participatory activities for young people, such as visual arts and video creation performances (Haynes & Tanner, 2015; Osnes, 2017). Through enabling meaning-making and self-expression around themes of identity, community, and place, art can serve as a conduit for discovering meaningful, place-based sustainable solutions for children and their local communities (Haynes & Tanner, 2015; Osnes, 2017).

An important Arts-based method with the potential to educate children about the challenges of climate change is Photovoice. In order to address environmental issues in partnership with community members, photovoice is a participatory, art-based approach. The primary objectives of the Photovoice approach are to empower people to map and contemplate on issues and strengths within their communities, to utilise images to facilitate thoughtful and critical group discussions on significant issues, and to promote social change. Through advocacy, storytelling, and images, Photovoice is an arts-based tool that enables individuals to represent and improve their community. Photovoice expands the range of voices and representational forms that help define and enhance our social, political, and health realities through the use of a participatory approach. Climate change is increasingly seen as a social and intergenerational concern since it disproportionately impacts people who have

historically made the least contribution to the problem—such as children and families in low-income nations (Stapleton, 2018).

Social Studies Teachers' and Students' Views on How Social Studies Curriculum Prepares Students to Respond to the Challenges of Climate Change

Teaching and preparing the next generation of students will require more than a simple curriculum reorganization, such as incorporating some social science and biophysical science into Social Studies, which is an integrated and comprehensive curriculum, due to the complexity of climate change (Sterling, 2001). To educate the next generation of learners and citizens to comprehend knowledge content about the complex climate system and its attendant challenges, to be 'emancipated' and start thinking about how and what we can do about climate change, it will be necessary to carefully rethink paradigms and the ways that curricula and knowledge about climate change are currently framed (Wals, 2011). These initiatives are required in order to produce a cohort of adaptable, interactive thinkers and doers.

Hawking (2012) posits that if mankind is to adapt to the difficulties of climate change, then education through its curriculum will play a critical role in developing understanding and assisting individuals, societies, and governments in making informed decisions. He further added that in order to achieve this an integrated curriculum such as Social Studies, Integrated Science, Geography and other will be effective in this direction. Curriculum areas and content domains related to climate change knowledge will need to incorporate not only local expertise but also more comprehensive approaches that are aware of, cognizant of, and sensitive to societal demands as well as the broader

environmental context in which decision-making takes place (Muhar, Visser & Van Breda, 2013).

Stapp et al. (1969) state that a comprehensive grasp of the causes, effects, and implications of climate change on contemporary society, as well as a thorough comprehension of the interrelationships among these, should be included in teachers' knowledge on the subject (cognitive knowledge). This information should also aid in discussing the difficulties that the environment presents to humans, how to solve them (psychomotor skill), and the obligation placed on students to contribute to finding answers. Additionally, their attitudes and care for the biophysical environment should reflect their knowledge, since this will inspire students to respond by helping to solve (affective domain) this problem.

As most advocates of climate education readily acknowledge, teaching about climate change is different from teaching about the quadratic equation because it has an explicit prescriptive element. As such, the purpose of climate change education goes beyond the mere transfer of knowledge; it also aims to stimulate a change in attitudes and behaviours in young people, preparing them to become the environmentally aware leaders, citizens and problem solvers of tomorrow (or perhaps today) (Crayne, 2015). A range of research has been conducted to determine how the global climate has changed and how education curricula around the world have adapted to this global concern.

In preparing Social Studies students to respond to climate change issues, Hawking (2012), posits that it is reasonable to provide students with the chance to critically examine concerns related to climate change locally and offer suitable answers. He went on to say that local observation of phenomena

involves setting up suitable settings so that students can watch an event and use it to build or mold their views. Students' original beliefs on climate change are shaped to become environmentally conscious through this process. The original notion or ideas are refined and reorganized during this procedure. As a result, the original concept is either reinforced or changed. According to Hawking (2012), this method of learning is comparable to experiential learning. Interacting with the environment is a key component of experiential learning. The process by which a learner creates biased emotive and cognitive interactions with the built and biophysical environments is known as knowledge construction.

The report from the IPCC (2018) states that education is important. It has three roles to play: first, it must contribute to the development of societal, personal, and institutional skills and attitudes for climate change mitigation in order to avert future climate change scenarios that could be the worst. Second, it must foster the knowledge, abilities, and mindset necessary for adaptation to the now obvious and impending effects of climate change. Thirdly, it continues to be a factor in promoting and strengthening awareness of the facts surrounding climate change.

The future of our world depends on educating the next generation of young people about climate change and how they may act to lessen its consequences. It is common to refer to climate change as the central concern of our day (Dimitrov, 2010). It puts the stability of socioecological systems worldwide in jeopardy and calls for extensive societal adjustment. The Intergovernmental Panel on Climate Change (IPCC, 2018) issued a warning in its most recent Special Report, highlighting the seriousness of the situation by

predicting that global atmospheric temperature could surpass 1.5˚C above preindustrial levels by 2040. The most disastrous social and environmental repercussions of the changing climate are now linked to crossing this critical threshold, which means that before they reach middle age, today's children's lives will be more frequently disturbed by climate change.

The ability to adapt to climate change depends on humans. Individuals, whether they be leaders in business, government, the community, or the general public, are ultimately the ones who initiate, inspire, guide, and enact the necessary reductions in greenhouse gas emissions to slow global warming as well as those who develop and implement sustainable adaptive responses to mitigate its effects.

To support children's agency and increase present and future community resilience in the face of climate change impacts, it is imperative that today's children be given the tools they need to comprehend and respond to climate change (Schreiner, Henriksen, & Hansen, 2005). Though they should receive the least guilt for climate change, children and young people will be the ones most affected by its effects. Therefore, it is essential that national policies and curricula be created to equip students to respond to climate issues (UNESCO, 2021).

According to Lawson et al. (2019), Social Studies students have the capacity to act through intergenerational learning and serve as effective communicators of information about climate change. This implies that teaching about climate change should take place in a variety of contexts, both inside and outside of schools, in order to prepare students to be engaged members of a society that is increasingly dealing with the effects of the phenomenon.

According to Sipos et al. (2018), Social Studies curricula that are oriented toward the 3-H model—Hands, Heart, Head—can better equip students to address the difficulties posed by climate change. According to the 3H learning model, transformative education results from instruction that engages the Hands (experiential learning and opportunities for action), Head (cognitive learning), and Heart (affective learning). Keeping this in mind, we can ensure that our students receive professional development in a formal education setting by offering opportunities for hands-on learning through teaching and community-based projects related to climate change; addressing knowledge of local and global impacts of climate change through head-on instruction; and meeting students where they are emotionally and belief-wise regarding climate change and helping them recognize how it aligns with their values (hearts-on) (VonBergen & Manon, 2020). Therefore, learners will not see long-term change as a result of a national curriculum that is decontextualized and ignores local interests and values.

A planning workshop was held in Indonesia in 2012 to talk about creating a national education plan on climate change. Various government agencies, businesses, academic institutions, non-governmental organizations, and United Nations organizations participated in this session. Another noteworthy aspect of Indonesia was the cooperation between the Environment and Education Ministries. A prior UNESCO (2021a) research saw that this kind of interministerial cooperation is critical to the advancement of climate change education policy.

Social Studies Teachers' and Students' Views on the Challenges of Social Studies Education in Responding to Climate Change Issues

Climate change is a major issue of both national and international concern which needs to be taught in schools by teachers. However, the teaching of climate change issues appears to be confronted with a plethora of challenges.

A cross-curricular policy analysis by Wyness, Harrison, and Buchanan (2004) revealed that one of the main obstacles to addressing climate change in Social Studies is the absence of specific action plans and curriculum frameworks; a lack of mechanisms for implementation and responsibility allocation; fragmentation between the policy and its execution as well as between subnational levels; a lack of engagement and knowledge among key stakeholders; and a lack of monitoring and evaluation of climate change practices. They continued by saying that while there are certain government policy initiatives to support climate change education, the current attempts to put these policies into practice appear insufficient to improve their execution. According to Wyness et al. (2004), there are several interconnected and mutually reinforcing barriers that contribute to the contested nature of climate change in the US. These barriers include the politicized nature of the issue and the general belief that politics is a domain best left for adults.

Some of the reasons why it can be challenging for teachers to bring up the subject of climate change in the classroom are covered in Chimes (2007). The fact that there are now few textbooks that cover it as a subject is one of the primary points. This is partially due to the recent emergence of the topic of global warming in secondary education. The inclination of publishers to steer clear of controversy is another topic covered.

In the view of Plate (2013), climate change teachers have inadequate conceptual foundation and are committed to facilitating learners' comprehension of environmental challenges in order to take necessary steps. They added that teachers who teach climate change have inadequate conceptual, pedagogical, and resource deficiencies.

Oversby (2015) contends that the lack of information about climate change in teacher preparation materials suggests that in-service teachers may not be knowledgeable about the subject matter and pedagogies. Furthermore, Oxarar, Loubser, and Simalumba (2016) have shown that Namibian teachers did not use a variety of teaching methodologies in addition to topic deficits. "Examination-oriented teaching" of climate change issues in the Seychelles is mentioned by Duval and Kanene (2016) as a barrier to teaching climate change and its related issues.

According to a 2017 study by Stylinski et al., teachers only teach about climate change for 0–3 hours per week, and 44% do not teach it at all. They listed climate change as one of numerous environmental challenges that are “briefly addressed." This shows that the Social Studies curriculum does not contain enough knowledge about climate change. They noted a number of requirements for incorporating climate change into their instruction, which are similar to the obstacles mentioned by instructors in our study: resources and materials, as well as training in climate change education. study cited: materials and resources and training in climate change education.

Another significant obstacle to teaching social studies topics connected to climate change is the lack of appropriate teaching resources. Materials that teachers employ to make teaching easier are called instructional resources.

Because rote learning and recitation may easily take over a lesson and become crucial for both the teacher and the students, instructional materials are essential. Students can acquire practical experience through the use of resource materials, which supports the development of concepts, skills, and work flexibility. This implies that engaging more senses than only hearing is necessary for Social Studies students to be able to take in more knowledge about climate change and actively try to remedy it. There are numerous ways that using audio-visual materials in the classroom can arouse the senses. They can have both visual and audio-visual components, and they can be concrete or not.

These educational materials bring learning to life by encouraging pupils to learn (Edinyang, Ejoh & Adams, 2020). The use of instructional resources in the classroom have the potential to assist the instructor in clearly explaining new concepts, resulting in improved student knowledge of the concepts being taught. They are, however, not ends in themselves, but rather means to an end (Edinyang, Ejoh & Adams, 2020). They added that teaching without the use of instructional materials is said to be incorrect. It is widely accepted that competent teaching resources can never replace the instructor, but they can help the teacher achieve their teaching and learning goals. The chalkboard, models, graphs, charts, maps, photographs, diagrams, cartoons, slides, filmstrips, radio, and television are some of the instructional tools required for efficient Social Studies teaching and learning. This suggests that the Social Studies syllabus cannot effectively prepare students without teaching and learning resources, which are essential components of understanding climate change and its accompanying concerns. A teacher is more certain, efficient, and productive when they have access to sufficient and pertinent instructional resources.

Teachers' unpreparedness to teach climate change issues was also identified as a challenge. A study by Hunter, Wang, Nelson and Bhattacharya (2022) stated that teachers feel unprepared to teach climate change issues due to lack of necessary resources. Even when they do teach about climate change, they consider how it affects the weather, water supplies, and food supply, emphasizing the daily effects that matter to the young people they work with. They steer clear of discussing its effects on the carbon cycle, social and political implications, and the dispersion and transmission of illness.

The Nature of the Senior High School Social Studies Curriculum

The curriculum or syllabus for Social Studies in senior high school provides a detailed explanation of the methods, approaches, and assessment techniques that will be employed by the teacher. With the intention of progressive development starting in junior high and continuing through senior high, the curriculum was developed through a top-down approach.

According to the MOE (2010), the topic is multidisciplinary and draws inspiration from a variety of fields, including civic education, geography, history, sociology, psychology, and economics (p. ii). This suggests that a social studies teacher needs to be knowledgeable about all of these topics, both pedagogically and content-wise. This integration maintaining discipline identity was dubbed by Lucan (1981) (p. 63).

Structure and Overview of the Syllabus

The three primary divisions of the senior high school Social Studies curriculum (MOE, 2010) organize themes according to class. Socioeconomic Development, Environment, and Governance, Polities, and Stability are the three headings. Eight subjects are necessary to be studied in the first year of

senior high school under the three previously indicated headings. Topics including National Identity, Adolescent Reproductive Health, Our Culture, and Self Identity are grouped under the general heading of Environment. Topics like National Independence and Self-reliance, Peacebuilding, and Conflict Resolution fall within the categories of Governance, Polities, and Stability.

The use of Ghana's resources, youth, and national development are all covered under the heading of socioeconomic development. Apart from the three core topics mentioned in the previous sentence, second-year senior high school students are supposed to study nine themes. The institution of marriage, individual responsibilities within the family, responsible parenting, socialization, and our surroundings will all be covered for students. All of these subjects fall under the broad category of Environment. Students will study Governance, Polities and Stability, which includes Nation Building, Democracy, and Our Constitution, in addition to Leadership and Fellowship. In conclusion, it is everyone's duty to advance sustainable socioeconomic growth in their community as well as national development. The last three topics are within the socioeconomic development umbrella (MOE, 2010).

Students are exposed to six topics in their third and final year of education in order to get ready for the external exam, the West African Senior High Certificate Examination. These include modifications to schooling, the physical environment and its difficulties, and societal shifts. These two topics are included in the environment. Subjects pertaining to politics, governance, and stability encompass the rights and obligations of the individual, Ghana, and the international community.

Finally, the student must study entrepreneurship, the working environment, and population growth and development. As stated by MOE (2010), the last two subjects fall within socioeconomic development. Each topic is presented and covered on a page that has five rows, with page one containing the syllabus. Below the word's "unit" at the top of the row is a summary of the themes and issues that each topic was intended to cover. There are also specific goals headed in the second row. The specific goals that direct instruction on the subject should be able to pinpoint the information listed below this section. Captioned content appears in the third row. Giving a summary of all the material covered in the subject—or, to put it another way, the body of knowledge expected of the students—this heading assists the teacher. Teachers include material from other textbooks on the subject into their classes, even though this will not be sufficient for the students. Both during and after the sessions, the teacher and students are expected to complete the duties listed beneath the fourth row.

Another essential component of the curriculum is evaluation. The lesson's success is determined by evaluation, which is articulated and occupying the fifth row. Each subheading for the topic groupings begins with a mention of general aims that span all three domains of the educational objectives. For instance, the first year's starting subheading, Environment, includes the following general objectives: Make use of your understanding of their strengths and potential to direct their own personal growth. Some, if not all, of these goals are centered around the three domains of the educational goals in order to be accomplished. Knowledge is concerned with the cognitive, planning and preparation is concerned with changing attitudes, and human-resource

interaction is concerned with behavior, which is within the psychomotor domain.

Empirical Review

The goals of the study were followed when conducting the empirical reviews. The following subheadings were covered by them.

Climate Change Issues Covered in the Social Studies Curriculum

In a similar vein, Konadu (2014) assessed the adequacy of Senior High School (SHS) geography syllabus in meeting the challenges of climate change in Ghana. The study was conducted in 52 Ashanti Region schools. A descriptive survey design was used in the investigation. Data was gathered via interview schedules and questionnaires. 318 persons made up the study's sample. There were 117 geography students, 52 senior high school heads, and 149 geography teachers in the Ashanti Region. While head teachers and students were selected by a census approach, the schools were selected through the use of the purposive sample technique. Ghana's Senior High School geography curriculum does not adequately address the topic of climate change, despite the fact that most respondents agreed that it was taught in the SHS. The study's findings indicate that the senior high school geography syllabus falls short in addressing climate change-related issues; nonetheless, it has drawn criticism for using closed-ended data collection tools that did not give respondents enough room to express their opinions. This could imply that the respondents were coerced into answering just the questions on the restricted set. This research has addressed a gap in the literature by considering students' understanding of climate, which was another significant constraint of the study.

Meehan, Levy, and Collet-Gildard (2018) examined how the origins, effects, and potential solutions of global climate change are portrayed in American high school textbooks and extra curriculum materials that were published between 2007 and 2012. These resources are connected to the same subject of climate change and are taught in Social Studies classes. We looked at eight sets of Global Climate Change (GCC) supplemental materials, four textbooks for Social Studies, and five textbooks for Science. By analyzing the text sections, they classified the curricula according to their recognition of the human causes of global climate change, its ramifications, and potential solutions.

The findings demonstrated that about half of the curricula link human activity to the current state of climate change; similarly, most curricula provide information about changes in the climate but not many details about the possible immediate or close effects of GCC; and finally, most curricula offer a restricted range of adaptation strategies to GCC. The results suggest that educators should evaluate the curriculum materials they employ to educate about climate change and that researchers should keep an eye on the ways in which pupils are taught about it.

In their study, Boateng and Boateng (2015) sought to ascertain the impact of tertiary institutions' curriculum coverage of climate change issues on public knowledge of the issue. They also sought to examine the extent to which these topics are covered. The results showed that just 14 of the 1,478 courses offered in the University of Ghana's Science department address subjects linked to climate change. Furthermore, they said that graduates from these universities might not be familiar with climate change issues because of the curriculum's

scant attention to these topics. This suggests that most climate change-related topics, such as how lifestyle choices affect climate change, how to measure climate change, how climate change affects health, and how information about climate change is packaged and distributed, may be unknown to these educators and members of their communities.

Similarly, Boakye (2015) examined the relationship between teaching climate change and pre-tertiary science curricula in Ghana. Their research showed that a few pre-tertiary science courses had an impact on how climate change was taught in Ghana. Four scientific curricula from Ghana's pre-tertiary school levels were examined using content analysis. These included the integrated science curriculum for grades 4 through 6 (ages 9 to 12), the junior high school's integrated science curriculum (grades 12 to 13), the senior high school's integrated science curriculum (grades 13 to 16), and the primary curriculum for grades 1 through 3 (ages 6 to 9). Even though only the SHS and JHS integrated science syllabuses specifically identified climate change as a topic for study, out of the four curricula, methods of education and learning still require improvement. This seems to indicate that the SHS and JHS integrated scientific curriculum is contributing to the solution of the problem in terms of climate change and associated challenges.

In 2017, Chew-Hung and Pascua carried out research on Singapore's climate change education curriculum. To find out what lessons on climate change were covered in various subjects taught in the Singaporean educational system, they looked into the curricula of those subjects. The authors disclosed that Social Studies was one of the courses that included subjects or issues related to climate change. They said that in order to address broad

environmental challenges, Social Studies is taught in Singapore at both the primary and secondary school levels. According to the study, third-grade social studies students are first exposed to Singapore's physical environment and how it affects the lives of its citizens. Emphasis is placed on issues including changes in land use, resource utilization, and environmental protection. There are two distinct approaches to social studies' study of climate change at the secondary school level. The preservation of the ecosystem is covered in detail in the Normal (Technical) class, emphasizing how interdependent humans and the environment are. The syllabus mentions the effects of human activity on the environment, but it does not specifically address climate change. Climate change is one of the subtopics covered by students studying Sustainable Development in Social Studies for the Normal (Academic), Express, and Special streams.

A cross-national research of middle school science and geography curricula in seven industrialised nations—Canada, Indonesia, Ontario, Israel, Australia, England, and Finland—on climate change curricula was also conducted by Dawson et al. in 2022. The research found that Indonesia and Ontario stood out in terms of treating climate change as a separate topic. Climate change is either buried under other topics or given as an example for something else in all other courses. It was also shown that climate change is addressed as a topic in Canada in Year 10, whereas in Indonesia the topic arises in Year 7. Six of the seven countries (with the exception of Israel) have published extensively on climate change in Science. In Israel, Geography takes the lead by extensively addressing seven countries as a theme of sustainability. It also unearthed that climate change is rarely acknowledged in the curricula of

Australia, England, and Finland. Overall, the assessment of the six curricula reveals a restricted conceptualisation of the extent of climate change, depending mostly on a fragmented approach in which aspects of climate change are handled under different themes in an insufficient manner. This means that several industrialized countries have made significant attempts to incorporate climate change and associated themes into their curricula.

An investigation into the necessity of including Climate Change education into the Social Studies curriculum was conducted by Anyanwu and Njoku (2023). Important topics including the idea of climate change, its impact on the environment and on people, and the necessity of teaching students about it were all covered in this study. The connection between social studies and climate change education was also discussed, as well as potential areas in which the principles of climate education could be applied to Social Studies curricular content. It was determined that relevant Social Studies curricular subjects may help raise the necessary awareness of climate change. In order to solve the issue of man's survival, it was suggested that there be a very effective and efficient integration of concepts and learning experiences of both subject topics, namely social studies and climate change. It is evident from the abandoned conversations that social studies curricula, particularly in Africa and Ghana in particular, underrepresent climate change and its attendant concerns.

Social Studies Teachers' and Students' Level of Knowledge about Climate Change

Tomas, Jan, Hollan, and Petr (2011) considered teachers' understanding of climate change in Czech Republic. They used an online survey design with items that centered on the functioning of the climate system. A total of 179

teachers across the country with different subject inclinations constituted the population for the study. Their study revealed that upper-primary teachers performed significantly better than the lower-primary teachers and physics teachers showed significantly better knowledge in climate change compared to the rest of the teachers. The survey also found that, despite the Czech Republic's declaration of mandatory education on climate change issues, there were actually issues with the way the subjects were taught. Once more, the study found that physics teachers are well-positioned to teach climate science since they possess a reasonable grasp of the climate system. It was discovered that upper-primary teachers had a weaker comprehension of the climate system than gym teachers did.

Liu, Roehrig, Bhatacharya, and Varma (2015) look into the attitudes and knowledge of in-service teachers on global climate change (GCC) and how it could affect their instruction in the classroom. Nineteen Native American educators took part in a professional development program as part of this study, which sought to enhance their knowledge of science and their ability to teach GCC in the classroom. While precise ecological beliefs varied to some extent, the majority of teachers who responded to questionnaires and interviews considered GCC as mostly human-caused and shared similar concerns about potential GCC implications. Throughout the seminar, teachers gained a greater understanding of the GCC's urgency and the importance of incorporating climate issues into their scientific lessons. Though misconceptions were occasionally found among teachers who were especially concerned about climate issues, instructors' attitudes and beliefs regarding the GCC were not a strong indicator of their level of comprehension.

A study by Undang and Agus (2017) which looked into how much knowledge instructors and students had on global warming. The study used a mixed method approach, with objective examinations serving as the primary data gathering tool. In Lampung Province, Indonesia, 573 junior and senior high school pupils as well as 230 teachers took the tests. To determine the association between teachers' identities, students' educational levels, and their gender as well as their understanding of global warming, data were gathered and subjected to two Way ANOVA and Tukey multiple comparison analysis. Students' awareness of global warming was found to be significantly influenced by their educational level, with secondary school students having greater knowledge and experience than elementary school students. Students' understanding of global warming is not influenced by their gender. Regarding the instructors' field of study, gender, or teaching location, there was no variation in their knowledge. Students who are older, more knowledgeable about global warming, and willing to give up pleasures may disagree on the actions that contributed to the rise in greenhouse gases.

Additionally, Odonkor, Dei, and Sallar (2020) carried out a national representative survey with the goal of assessing Ghanaians' comprehension and capacity for climate change adaptation. The survey sample consisted of 674 adult Ghanaians. Their results showed that 43.9% of participants understood the idea of climate change. The reasons for climate change, according to the respondents, include the burning of fossil fuels, deforestation, natural phenomena like ocean currents, carbon emissions from automobiles and factories, nitrous oxide emissions from fertilizers in agriculture, and acts of God. The study found that the three most common ways people learned about

global warming were through television (19.1%), national radio (27.7%), and training (30.1%).

Regarding the matter of teachers' and students' comprehension of climate change, Kwenin (2021) examined social studies' involvement in addressing climate change in Cape Coast Metropolis primary schools. The findings of his research suggest that although social studies educators are spearheading or actively pursuing the integration of climate-related topics into the curriculum, they are deficient in the skills, knowledge, and competency required to successfully convey these challenges to students. He continued by saying that the instructors' understanding of climate change was limited to their experience in subjects other than social studies.

Ahmed et al.'s (2022) investigation of college and school teachers' attitudes toward climate change considered their educational levels and firsthand encounters with its effects. 95 teachers from three schools and institutions in the Bangladeshi city of Sylhet—two private and one public—were included in the study. The results demonstrated that the majority of educators are aware of and comprehend the concept of climate change. The majority of them also believe that Bangladesh's rainfall and temperature are growing and fluctuating, respectively. It was also shown that the views of educators regarding climate change vary depending on whether they work in a public or private educational setting and if they think extreme weather events are likely to occur in their hometown. The type of educational institution and the teaching levels at which the teacher teaches are two important determinants of teachers' attitudes regarding climate change, according to the binary logistic regression results. A statistically significant relationship has been found

between the educational institution, bachelor's degree study area, hometown that is susceptible to extreme weather events, and the number of environmental or climate change-related courses taken, according to the multinomial logistic regression analysis of perceptions about changes in precipitation.

Appropriate Methods used by Social Studies Teachers in Teaching Climate-Related Issues in the Curriculum

In Janie and Grant's (2016) study, "Teaching about Climate Change in Medical Education," they argued that in order to deepen existing knowledge and strengthen graduate attributes, as well as to prepare students for clinical practice in a world where climate change is a reality, climate change education should be integrated into the curriculum. They mentioned that some methods for teaching themes related to climate change include lectures, placement projects, case-based learning, reflective diaries, and tutorials on clinical skills. Additionally, they offered several recommendations for improving student involvement, including pre-learning, peer-to-peer instruction, panels, and debates.

An organised analysis was carried out by Martha, Richard, Annie, Alison, and Willandia (2017) in order to better grasp what research may offer to our understanding of effective climate change education. Using the academic database EBSCOhost, our investigation discovered 959 unique citation records addressing climate change education. 49 of these sites in all met the requirement of focusing on the evaluation of initiatives in climate change education. The analysis of these sources looked at the purpose of the intervention, the evaluation procedure, and potential success factors for interventions. According to their research, the majority of environmental education consists of two

elements: (1) stressing personally relevant and meaningful knowledge; and (2) using dynamic and engaging teaching tactics. Concerns like climate change were also given four distinct themes: (1) having thoughtful conversations, (2) speaking with scientists, (3) clearing up misconceptions, and (4) carrying out community or school-based projects.

Abudulai (2020) conducted another study on the effects of social studies instructors' familiarity with Senior High School teaching approaches on the attitudes, values, and abilities of their pupils. The study's conclusions indicate that most senior high school social studies teachers are conversant with problem-solving strategies, games and simulations, project work, and demonstrations.

Jibililu (2021) looked studied how social studies teachers in Ghana's Ho Municipality Senior High Schools include outdoor activities into their lesson plans. The study included the selection of seventy (70) Social Studies teachers from fourteen (14) Senior High Schools in Ghana's Ho Municipality, using a concurrent mixed method design that employed convenience and purposive sampling approaches. Questionnaires and interviews were the main means of data collection. The study's findings showed that, despite the challenges involved in utilizing outside approaches, the majority of social studies instructors consider these extracurricular activities because they are valuable teaching resources.

According to Kwenin's (2021) research, the majority of social studies educators use the conversation technique when instructing students on climate-related topics. This suggests that teachers of social studies are at ease using a student-centered approach to instruction.

Similar to this, Kwarteng's (2022) qualitative investigation looked at the methods and approaches used in the three senior high schools in the Sefwi Wiawso Municipality in the Western North Region of Ghana. The study's participants were the ten (10) Social Studies teachers at the three public senior high schools—Wiawso Senior High School, Wiawso Senior/Technical School, and Asawinso Senior High School—located in the Sefwi Wiawso municipality in Ghana's Western North Region. Purposive and convenient sampling procedures were employed in the study to select social studies teachers as well as members of the town and schools. The main method used to acquire data was interviews. According to the study, teachers used a variety of teaching strategies, including problem-solving, concept development, role-playing, brainstorming, modeling, discovery-learning, and dramatisation. This implies that they favored teaching social studies in a way that put the needs of the students first. The survey also showed that social studies teachers encouraged their pupils to interact with their surroundings and local community by using techniques and strategies such concept attainment, field trips, and debate cooperative learning.

How the SHS Social Studies Curriculum Prepares SHS Students to Respond to the Challenges of Climate Change

According to Taber and Taylor (2009), educating young people about climate change can reduce anxiety associated with it, empower them, and inspire them to engage in appropriate mitigation and adaptation activities. These behaviors can then be passed on to the students' families through the students' influence over other decision-making processes and purchases. Baker and Loxton (2013) discovered that when it comes to this same subject,

educators heavily depend on traditional media, such as books, newspapers, TV news, and other sources. They also exhort their pupils to follow suit. The study looked at pre- and in-service Nova teachers' views and knowledge of climate change. Less instructors said they learned things from professional development, government websites, non-profit organizations, university courses, and other internet resources like blogs and Wikipedia.

Buadi (2012) considered the curriculum for development and climate change response. He said that Ghana had recently experienced some unforeseen weather events. These consist of heavy rainfall, floods, and extremely high air temperatures. Scientists look for reasons and point out that climate change is the cause of the phenomena. The study looked into the definition of climate change as well as the problems it presents for the ecosystem and its people. It was found that local climate conditions have a significant impact on the growth of any nation since they can affect people's actions. Unfavorable weather patterns including protracted drought, unceasing downpours, and flooding can hinder the advancement of society. Every nation needs to learn about the characteristics of climate change in order to understand its ramifications and prepare to mitigate the worst effects. This is due to the disastrous events brought about by climate change, such as intense heat waves, torrential downpours, and the resulting health hazards. The research put up the idea that Ghana's curricula for elementary, intermediate, and post-secondary education may aid in the dissemination of knowledge on the various facets of climate change. One basic strategy to address climate change is to identify its causes, and this is where the report might be criticised for failing to do so.

Social Studies Teachers' and Students' Views on the Challenges of Social Studies Education in Responding to Climate Change Issues

Gordon's (2010) study discusses the difficulties Social Studies has in tackling climate change. The study revealed that most students consider climate change to be a science subject rather than a Social Studies notion, and that the media, particularly the internet and television, frequently presents them with misleading information about it. This false knowledge has a significant impact on their attitudes, convictions, and behaviors toward their surroundings.

According to Fortner (2001), many teachers may not have studied climate change personally, as it is a relatively new subject taught in schools. It is quite probable that educators possess expertise in a limited number of scientific fields, rather than multidisciplinary sciences. Instructors already have to deal with a curriculum that is too full and a pace that doesn't give much time for extracurricular activities. Because of this, they can decide that there isn't enough time to discuss related ideas in further detail.

Odoom (2020) conducted a qualitative study to better understand the challenges and motivating factors faced by Cape Coast Metropolis primary school teachers implementing the climate change education curriculum. The goal of the study was to determine what kind of support these teachers would need to continue working with the emerging curriculum, which is being used at the basic education level in Ghana. Out of the 69 schools in the city, ten randomly chosen schools provided 20 instructors for semi-structured interviews. The findings showed that instructors' comprehension of the idea of teaching about climate change was weak.

Summary of Literature Review

The literature review emphasized topics that touched on the conceptual framework that dealt with the concept of climate, the degree of knowledge that social studies teachers and students have about climate change, the topics covered in the curriculum, whether or not it is appropriate to teach climate-related topics in the curriculum, how the curriculum for social studies in high school prepares students for the challenges of climate change, and the opinions of social studies teachers and students regarding the difficulties in responding to climate change issues through Social Studies. Once more, the primary theories that directed the research were social reconstructionism and social efficacy theories, both of which were thoroughly reviewed.

Several researches have been carried out to determine how the global environment has altered and how school curricula worldwide have responded to this global challenge. These studies include: The syllabus response to climate change and development was the subject of a study by Buadi (2012) and Kwarteng (2022), who also looked at the methods and approaches used in the assessment of Social Studies concepts in the three senior high schools in the Sefwi Wiawso Municipality in Ghana's Western North Region.

According to these researches, several countries have made a significant effort to include Education for Sustainable Development concepts into their curricula in an attempt to address climate change. The related literature has enabled the researcher to reach the current state of our investigation by giving us further direction on how to carry out our investigation. Additionally, it has made it possible for the researcher to determine which aspects of our study have previously been investigated and which still require investigation.

CHAPTER THREE

RESEARCH METHODS

Introduction

The research techniques used by the author were covered in this chapter. This chapter covered the following topics: research design; study area; population; sample and sampling technique; data collection tools; data collecting procedures; and analysis procedures.

Research Design

Using the convergent parallel design in this study, the mixed-methods technique allowed the researcher to collect, analyse, and present the quantitative and qualitative data simultaneously, while combining them during the data interpretation stage. The researcher was able to conduct both quantitative and qualitative components of the study at the same time, weight the approaches equally, analyse the two parts separately, and interpret the findings jointly thanks to the convergent parallel design. The legitimacy and dependability of the data were enhanced by the utilization of several data sources and data collection techniques. This occurred as a result of one source's advantages over the possible disadvantages of the others (Johnson & Onwuegbuzie, 2006).

The convergence and verification of findings in mixed-methods research provided additional support for the study's conclusions. By using a mixed method approach, I was able to fully analyse the research issues that were addressed by employing both the questionnaire and interview replies. The conclusions of my study were further supported by the convergence and confirmation of data obtained from mixed-methods research.

This technique was chosen for another important reason that it gave the researcher access to a large population and a variety of data. It was also used to examine how well-informed, how people approached problems, and how difficult it was for them to deal with the issues raised by climate change in relation to the SHS Social Studies curriculum (Babbie, 2007). A wider range of research concerns were addressed by the mixed method approach in a more thorough and comprehensive way. A study's conclusion can be more accurately indicated by the mixed method design thanks to the convergence and confirmation of the data.

Study Area

In Ghana's Central Region, namely in the Cape Coast Metropolis, the study was carried out. The Cape Coast Metropolis is located between longitudes 1.11º and 1.41º West of the Greenwich Meridian and between latitudes 5.07º and 5.20º North of the Equator. With 118,106 people living in the metropolis, which has a total land area of about 122 sq. km (12,200 hectares), 57,365 of them are women and 60,741 of them are men. 60% of people are involved in agriculture-related activities, including farming, fishing, and other similar occupations. 99.7% of the population is engaged in agriculture. The majority of the vegetation is secondary forest, with bushes and thickets reaching an average height of 4.5 meters. There is a 13 km or so stretch of coastline. Asamoah (1973) reported that the temperature ranges from 24 to 32 degrees Celsius, while the relative humidity varies from 70% to 90%.

The rainfall pattern in the area is bimodal, peaking in May and June and October. The total amount of rainfall that falls each year varies from 900 mm along the shore to 1100 mm to 1600 mm in the hinterland. November and

February are when dry spells, or harmattan, occur. The land is mostly hilly, with a maximum elevation of about 60 meters above sea level. The capital of Ghana's Central Region is the fishing city of Cape Coast. Cape Coast is situated south of the Gulf of Guinea. Cape Coats had 169,894 settlers (Ghana Statistical Service, 2010). The Gulf of Guinea borders the Cape Coast Metropolis to the south; the Komenda Edina Eguafo Abrem Metropolis (Iture bridge) borders it to the west; the Abura Asebu Kwamankese District borders it to the east; and the Twifu Heman Lower Denkyira District borders it to the north. The Metropolis encompasses an area of roughly 122 square kilometers, with Brabadze serving as its furthest point. Cape Coast, the Metropolis's seat, and the Central Region are located roughly 17 kilometers away.

The savannah and the woodland zones are the two primary vegetation zones in the Metropolis. The Southern Belt, which is predominantly coastal grassland, and the Middle Belt, which is primarily composed of woods, make up the savannah. The Northern Belt of the Metropolis contains the Forest Zone. The University of Cape Coast (UCC) has its headquarters in Cape Coast. The top institution in Ghana for research and teaching is perched on a hill with a view of the Atlantic Ocean. Cape Coast Technical University, one of the top technical universities, is located there as well. Notable other universities in the city are the Institute of Development and Technology Management (IDTM) and the Mfantsiman Institute of Technology (MIT).

Population

All social studies teachers as well as SHS two and SHS three students enrolled in Senior High Schools (SHS) in the Cape Coast Metropolis during the 2022–2023 academic year made up the study's population. The target

population was made up of these. Social Studies is a required course that all students must read, which is why all of the pupils were chosen. Because of this, all pupils were qualified to take part in the study. SHS Forms 2 and 3 were also chosen because, in comparison to Form 1, they have more experience and sufficient knowledge in Social Studies, particularly Form 3.

There are 11 Senior High Schools in the Cape Coast Metropolis. These schools were represented with the alphabets (A, B, C, D, E, F, G, H, I, J, K) for confidentiality and anonymity. The total population of Social Studies Teachers within the SHSs in the Metropolis according to Metro Education Office, Cape Coast (2022) is 87 and that of the SHS two and three students is 9, 549 and 9,519 respectively. All the 87 Social Studies teachers were included (census) in the study due to their small size. Table 1 presents the teachers and students population within the Metropolis.

Table 1: Population distribution of teachers

Name of school	Students' Population		Teachers' population
	SHS 2	SHS 3	
A	719	555	8
B	1171	853	8
C	750	721	9
D	761	544	6
E	1084	1096	11
F	981	1814	8
G	799	1003	8
H	499	656	4
I	995	592	6
J	941	909	14
K	849	776	5
	9,549	9,519	
Total	19, 155		87

Source: Metro Education Office (Cape Coast, 2022)

Sample and Sampling Procedures

A total of 320 Social Studies students comprised the sample. From all of the senior high schools in the Cape Coast Metropolis, Social Studies students

were chosen. Krejcie and Morgan (1970) state that a sample size of 315 is necessary for a population of 19, 068, but the researcher expanded it to 320 to account for low return rates and other unforeseen circumstances. This influenced the pupils' choosing process. The population of each school was divided by the total population of all the schools to determine the sample size for each school, and the resulting number was then multiplied by the sample size as a whole. The sample's details are shown in Table 2.

Table 2: Sample distribution of students by their schools

Name of school	Students population SHS 2	N	SHS 3	N	
A	717	12	555	9	21
B	1171	20	853	14	32
C	750	12	721	12	25
D	761	13	544	9	22
E	1084	19	1094	19	36
F	981	16	1814	30	46
G	799	13	1003	18	30
H	499	8	656	11	20
I	995	17	592	10	27
J	941	16	909	15	32
K	849	14	776	13	28
Total	9,549	160	9,519	160	**320**

Source: Field work, 2023

The demographic characteristics are presented in Table 3.

Demographic Variables of Respondents

Table 3: Sex of Social Studies of Students

Sex	Students		Teachers	
	No.	%	No.	%
Male	200	62.5	65	74.7
Female	113	35.3	22	25.3
Total	320	100	87	100

Field work 2023

Table 3 presents the sex distribution of students (N=320) in the various selected schools. From this, 200(62.5%) were males whiles 113(53.3%) were females. This implies that more males from the schools participated in the process than females. This is attributed to the fact that more males were found in the general Arts and Business classes where most of the questionnaires were normally administered and also the three (3) boys' schools (B, C, E) in the sample. Again, Table 3 denotes that out of 87 teachers who took part in the study, 65 (74.7%) were males whiles 22(25.3%) were females. Majority of the respondents were males. This result is not surprising as it seems to confirm the pattern among students who are pursuing Social Studies at the University level, most of them are males which transcends to the SHS where a lot of are teaching Social Studies. The academic qualification as well as the ages of the Social Studies teachers are presented in Table 4.

Qualification and Age Social Studies Teachers

In Table 4, the ages and academic qualification of Social Studies teachers are presented using mean and percentages.

Table 4: Qualification and Age of Social Studies Teachers

Variables	No.	%
Current Qualification		
First Degree in Social Studies	32	36.0
Masters in Social Studies	55	61.2
Years of Teaching		
Under 5 years	2	3.4
5- 9 years	8	9.0
10- 14 years	14	15.7
15- 19 years	30	33.7
20- 24 years	14	15.7
25+	18	20.2
Total	87	100

Field survey, 2023

From Table 4, the results indicate that out of (N=87) 32 (36%) possess the minimum qualification specified by the ministry of Education (Ghana) for teaching at the SHS level. Again, majority of teachers 55(61.2%) hold master's degree in Social Studies. This could either be attributed to the proximity of the schools within the Metropolis to the University of Cape Coast, and hence the teachers have taken advantage to pursue further studies According to Davis, Gregory, and Riley (1999), teachers should have a solid intellectual background that places them in a unique position to address Social Studies with confidence and skill. Higher education degree holders are expected to do better in their jobs and have a greater impact on their students than do educators with less advanced degrees, according to Okoro (2004). This suggests that social studies instructors in the Cape Coast Metropolis may be more knowledgeable about climate change and have a bigger influence on their pupils.

Data Collection Instruments

Data on the study's two to five research questions were gathered using two distinct instruments. Appendices A, B, and C contain the questionnaire and interview guide, respectively. Regarding the first study question, a comprehensive content analysis of the SHS was conducted to evaluate how well the curriculum addressed topics related to climate change.

Questionnaire

The researcher prepared the questionnaire, which had five components based on the study's goal. Two sets of questionnaires were designed: "Climate Change Questionnaire for Social Studies Teachers' and "Climate Change Questionnaire for Social Studies Students." The questionnaires were the same for both the teachers and students. Each questionnaire category contained five

sections labelled A, B, C, D, and E. Section A of the questionnaire collected personal information such as gender, age, teaching experience, and academic qualification. Items in Section B assessed Social Studies teachers' familiarity with issues related to climate change. Data on curriculum-based approaches used by Social Studies instructors to address climate change problems were covered in Section C. Data on Social Studies instructors' and students' opinions of the difficulties in adapting Social Studies syllabus to address climate change issues were collected using Section D. Teachers' and students' perspectives on the difficulties in addressing climate change issues through social studies instruction. The measurement was done using a 5-point Likert-type scale: 1 = strongly disagree, 4 = agree, 3 = unclear, and 5 = strongly agree. Because the Likert scale allowed my respondents to express how much they agreed with a statement, the items were organized in a similar manner. Respondents were allowed to express uncertainty over certain claims using the 5-point rating system.

Furthermore, the five-points appeared to be clearer and easier to comprehend than the seven points. The construction, scoring, and administration were simple (Kimmon, 1990). The questionnaire contained forty-four (41) items, including thirty-seven (37) closed-ended questions and four (4) open-ended questions. The questionnaires were entirely consistent with the literature studied. The questionnaire proved to be cost-effective and time-saving. Also, the use of surveys was favored because of their accessibility. Because questionnaires are easier to approach than other approaches and do not suffer from no-contact issues, their usage allows researchers to explore a wider range of topics.

Interview Guide

The researcher supplemented the questionnaire with interviews, which allowed him to gain a greater understanding of the instructors' thoughts on climate change. The researcher was able to examine a wide range of respondents' viewpoints through the interviews, which also revealed important aspects of climate change in the social sciences. Respondents were able to concentrate on the study issues during the semi-structured interview, which also created new questions for the future. Ten questions in the semi-structured interview addressed the initial four study issues. The ability to delve deeper into features like instructors' knowledge after the survey was completed made the interviews especially helpful (Creswell, 2003).

When asked if the SHS Social Studies syllabus covers climate change issues and what the best strategies are to incorporate climate-related issues into the curriculum, Social Studies teachers in Cape Coast Metropolis schools responded. Questions about social studies instructors' awareness of climate change, their opinions on the difficulties facing social studies education in tackling climate change, and how the SHS social studies curriculum equips SHS students to deal with climate change were also included in the interview questions. Interviews also appeared to allow the researcher to deal with problems such as participants' thoughts, answers, motivations, and emotions. However, this was time-consuming in terms of finance and resources because the researcher had to move from one area to another while collecting data (Bell, 2010).

The study used a semi-structured interview guide. This is because, in contrast to previous interview formats, the semi-structured interview aimed to

combine the flexibility to go deeper into a list of subjects to be covered with a structured format (Thomas, 2009). Dawson (2015) claims that semi-structured interviews are the most common style of interview in qualitative social sciences and humanities.

Validity of Instruments

The content validity techniques were implemented into the research. The assessment of the survey instrument by experts in education served as the foundation for content validity.

The instruments were pre-tested during piloting to allow the researcher to improve their validity while also becoming comfortable with the data collection process. Pre-testing of tools assisted the researcher in identifying unclear and ambiguous wording and obtaining information about likely outcomes. In order for the researcher to be certain that the items in a survey research questionnaire evaluate the construct that it is meant to test, questionnaire validation is necessary (Opuku, 2005).

The original instruments were delivered to experts and other experienced researchers, including the researcher's supervisors, who assessed the instruments' content for ambiguities, mechanical faults, and irrelevant elements. For example, repetitive items were removed from the questionnaire. In addition, certain elements in the questionnaire and interview guide were modified based on expert corrections, comments, and feedback. Also, the views, comments, additions and deletions that were raised as a result of the pilot-testing were effected.

According to Burns (2000), a study has some validity if participants can understand the study's findings. Consequently, colleagues pursuing a Master of

Philosophy in Curriculum Studies and Teaching (Social Studies) as well as the researcher's supervisors evaluated the validity of the instrument, namely its face and content validity. In order to do this, the content was reviewed to make sure the measurements were accurate.

In ascertaining the validity of the qualitative instrument, the transcript was checked to ensure it is devoid of obvious mistakes with the transcription. This according to Creswell (2009), this makes the account becomes more realistic and valid. The researcher used external auditor to appraise the whole study to enhance its validity. This was because, according to Creswell (2009), having autonomous investigator to look over many aspect (accuracy of transcription, level of analysis from raw data to its meaning) improves the general validity of qualitative study. In view of this, the work was given to some experts in the field of mixed methods research to review it.

All possible best mechanisms such as assurance of confidentiality and anonymity of respondents were put in place to help minimise the amount of prejudice as much as possible in the use of these instruments. The respondents were also assigned with pseudo names (teacher S, Q, O, T) instead of their real names to ensure anonymity and confidentiality. Attempts were made to minimise threats of validity which were likely to originate from attitudes, opinions, as well as the prospects of the interviewer and misperceptions on his part as to what respondents are saying. For example, making sure the exact words were recorded. However, during the interview session, some probing questions were used in order to sure the interpretations of their statements were the exact. Direct quotations were also used in helping readers by acknowledging the real world.

In a summary, the purpose of instrument validation was to identify any deficiencies, ambiguities, and difficulties with the instruments (Sarantakos 2005). This allowed the researcher to make any necessary adjustments before to data collection. This helps to check for item redundancy, missing information, relevance, clarity, and validity of the questions. According to Ary, Razavieh, and Sorensen (2006), field testing of instruments enables for the determination of item applicability.

Reliability of Instruments

The questionnaire's reliability was established by recording the pilot data in SPSS (version 25), which was then estimated using the Cronbach Alpha test. The reliability estimate was based on the many variables across the entire questionnaire. The amount of understanding regarding climate change among Social Studies teachers and students was particularly noteworthy.92. Appropriate techniques for addressing climate-related concerns in the Social Studies curriculum existed.87, Social Studies instructors' and students' perspectives on the obstacles that Social Studies education faces in responding to climate change issues.92. In terms of how the SHS Social Studies curriculum prepares students to respond to the concerns of climate change, the outcome was.91. This helped us estimate the study's dependability value. The pilot testing included a sample of fifty (50) Form 2 SHS students and ten Social Studies teachers from Nyankumasi Ahenkro Senior High School in the Assin South District Assembly, and the values obtained helped determine the reliability of the instruments. The Cronbach Alpha test for reliability estimation was utilized because De Vellis et al. (1991) propose that Cronbach alpha is an adequate measure of an instrument's internal consistency, therefore the use of

Cronbach alpha co-efficient to evaluate the degree of the instrument's dependability.

In addition, Fraenkel, Wallen, and Hyun (2012) used their interpretation of the Cronbach alpha coefficient to establish the instrument's appropriateness. A reliability coefficient of 0.6 to 0.9 is regarded as highly accurate for establishing the instrument's appropriateness (Fraenkel, Wallen, & Hyun, 2012). Face validity was 95% on average. The study's dependability was measured using Cronbach's alpha, and the reliability coefficient came out to be 0.8. To ensure that a set of scale items measured the same attributes, the internal consistency of the scale items was assessed using Cronbach's alpha test. As a result, if the instrument produces an alpha value within this range, it is considered acceptable for measuring the constructions meant to be measured.

Data Collection Procedure

The researcher used several data collection techniques in order to answer the research questions. With the aid of semi-structured interview guides and questionnaires, the anticipated pertinent data was gathered. With the help of a few seasoned research assistants, the researchers distributed the questionnaires to the students in their respective schools. A letter of introduction from the Department of Business and Social Sciences Education at the University of Cape Coast (see Appendix D) served as a preamble to the instrument administration, introducing the researcher to the participants. The researcher also met with respondents individually in their respective schools and offices to arrange on a convenient time for administering the instruments. Before collecting data, the researcher obtained respondents' agreement and described the goal of the study. The introduction of questionnaires captured

such areas as respondents' confidentiality and anonymity, ensuring that whatever information they provide is as confidential and anonymous as feasible. Respondents were also advised of their right to decline participation. Participants were free to provide their own answers to each item as requested by the researcher. After that the responders had enough time to finish the questionnaire. The researcher provided them with constant supervision and support. The data gathering period between the 13th and 20th of May 2023.

Regarding the distribution, administration and collection of the questionnaires, the researcher used a period of one week. Some of the respondents responded to the questionnaire and others were interviewed using the interview guide. The process involved the administration of 320 copies of the questionnaire to the students and 87 to teachers in May, 2023. All the questionnaires distributed to the students were returned hence the questionnaire rate of return was 100% but with that of the teachers, the return rate was 98% but some of the teachers did not return the questionnaire.

Additionally, I spoke with eleven Social Studies instructors in-person. In my opinion, doing the interviews makes the process more reliable as a consistent approach is taken. When conducting the interviews for this research, a systematic protocol was followed to make sure the data obtained was in line with the goals of the study. The researcher welcomed volunteers and went over the dangers at the start of the trial. Again, semi-structured in-depth interviews with participants were conducted in their offices and schools. Third, within ten days of the interviews, an audio recording and transcription were made. When we finally made informal follow-up contact, I played the interviewees the taped conversation again to make sure they understood what had been discussed and

that the session had been accurately recorded. This action was also prompted by the challenges encountered in returning the transcripts to the interviewees..

Additionally, each participant received a transcript for the purpose of member verification and content verification. Ten to fifteen minutes were spent interviewing the teachers. Because there were only eleven things and the open-ended questions were simple yet flexible, the interview sessions were brief. Despite the fact that the interview questions were standardized, open-ended questions, I nonetheless searched for more detailed information when respondents seemed to be lacking in their responses.

Ethical Considerations

The University of Cape Coast Institutional Review Board (see Appendix C) gave its approval before the data collection process started in order to address ethical concerns. All study participants were told about the purpose, methods, and possible applications of the results in order to get informed consent. Since teachers and students from different institutions made up the majority of the study informants, authorization to contact the respondents was first obtained from the institutions.

The respondents' confidentiality was respected as needed. Respondents were ensured of anonymity and confidentiality by implementing an administration system that required participants to specify just their courses, ages, and gender, excluding their names. Additionally, the option to withdraw from the study at any moment was disclosed to the respondents. In terms of meeting standards and ethical considerations, the right to privacy, voluntary involvement, no harm to participants, anonymity, and confidentiality were highly valued. Students have rights to privacy, which must be maintained at all

times. In this regard, respondents' privacy rights were respected, and no information was collected from them without their knowledge or consent.

Another important aspect of ethical research is respondents' voluntary engagement. The importance of the study was explained to the respondents because questionnaires take a while to complete. On this notification, respondents were given the opportunity to exercise their voluntary right to participate in the study. Nobody was pressured into participating in the study.

Furthermore, it is widely recognised that unethical behavior, such as plagiarism, is not tolerated. This typically occurs when a researcher falsifies, distorts data, or lifts other people's work, with or without citation. To avoid plagiarism, this work strictly adhered to the established scientific conduct norms. Notably, ideas, works, and writings were acknowledged by providing suitable references in the in-text and primary referencing styles used by the University of Cape Coast. As a result, the study followed accepted ethical research principles. All entry institutional protocols were followed prior to data collection. After the exercise was completed successfully, all participants in this particular research were properly informed of its significance to the nation.

Data Processing and Analysis

After being gathered, the questionnaires were reviewed for completeness. Where necessary, the questionnaires were corrected. Numbering the questions made data cleansing simple. Tables and figures were used to arrange and display the data. The researcher was able to compile the data and summarize it as a result. The program Statistical Product and Service Solution (SPSS version 25.0) was used to import the data obtained from the questionnaire. The fact that this program could manage a lot of data led to its

usage. Following data entry, the entered information was cleaned up and contrasted with the original.

The responses from the interviews were transcribed, and then thematic narrative analysis was used for an in-person assessment. This approach involved analysing all of the interviewees' responses to a single question collectively. After that, the recurring themes in the responses were located, looked over, and analysed item by item. The researcher manually transcribed each respondent's audio recordings onto paper after playing back each one as part of the examination. The transcript of the interview was done sentence by sentence and phrase by phrase to prevent any misunderstanding of the content or sense of the material that the respondents had provided. To analyse the first research question, a qualitative content analysis of the GES (2010) SHS Social Studies syllabus was conducted. Frequency counts, percentages, averages, and standard deviations were employed to evaluate the respondents' answers to research questions two, three, four, and five in addition to their demographic data. The specifics are shown in Table 5.

Table 5: Statistical Tools Research Questions

Research Question	Instrument	Scale	Analytical Tool(s)
1. How adequate the SHS Social Studies curriculum covers climate change issues?	Syllabus		Qualitative Analysis
2. What are Social Studies teachers' and students' level of knowledge about climate change?	Questionnaires and Interview	Nominal	Descriptive statistics: Mean, standard deviation
3. What appropriate methods are recommended for o teaching climate-related issues in the curriculum?	Questionnaires and interview	Nominal	Descriptive statistics: Mean, frequency count
4. How does the SHS Social Studies curriculum prepare SHS students to respond to the challenges of climate change?	Questionnaire and interview	Nominal	Descriptive statistics: Mean, standard deviation
5. What are Social Studies teachers' and students' views on the challenges of Social Studies education in responding to climate change issues?	Questionnaires and interview	Nominal	Descriptive statistics: Mean, standard deviation

Summary

The chapter described the many ways used to acquire and analyse the data. The chapter also covered the study area, research strategy, and study population. The research instruments employed were a questionnaire and a scheduled interview. The study's sample methodologies included the table of random numbers method, the simple random sampling method, purposive sampling, and the census method. The chapter concluded with descriptions of instrument pre-testing, data collection protocols, and data analysis. The following chapter will focus on the study's discussion and outcomes.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results and discussions of the main research questions from the analyses of data collected. It also discusses and makes inferences from the results of the study. The purpose of the study was to explore the adequacy of the senior high school Social Studies in meeting the challenges of climate change. The study adopted the convergent parallel design using the mixed method. The results were presented on issues in accordance with the study's purposes and research questions. In all, 5 research questions were formulated to guide the study.

The Likert-type scale had five points: five for strongly agreeing, four for agreeing, three for being indecisive, two for disagreeing, and one for strongly disagreeing. The average for the permissible mean value (1+2+3+4+5 = 15/5 = 3) was calculated by adding the weights. Therefore, a mean value of 3 indicated that respondents were unsure about the statement or item, whereas a mean value of 3.1 to 5.0 indicated that respondents agreed. When the mean score was less than 3.0, it indicated disagreement among the respondents. To determine the overall proportion of disagreement, the opinions of those who disagreed and those who disagreed severely were combined.

The outcome of the study was presented in tables for simplicity and illustrations. Frequency count, percentages, means and standard deviation were the main analytical techniques employed in the presentation of the results for the quantitative aspect. The qualitative aspect was analysed qualitatively. The results, however, are presented in three sections. The second and third presented

the documents analysis of research question one and the analysis of main research questions. The demographic characteristics are presented in Table 7.

Research question 1: How adequate the SHS Social Studies curriculum covers climate change issues.

The researcher's content study assesses how well the SHS Social Studies curriculum addresses concerns related to climate change. Educating students in social studies, which examines how humans interact with the environment, is essential to addressing the problems caused by climate change. The curriculum must sufficiently address topics related to climate change, its challenges, and mitigation strategies in order to tackle the challenge. In order to determine whether any topics in the SHS Social Studies curriculum directly address climate change and its related challenges, the researcher conducted a content analysis of the curriculum as part of this study. There are 23 topics in the SHS Social Studies curriculum (GES, 2010). When the researcher qualitatively analysed the 23 topics of the three-year Social Studies curriculum, it appeared that none of topics directly addressed climate change.

Although the researcher believes that climate change issues can be included into at least six (6) areas in the syllabus, the Social Studies syllabus did not explicitly address the matter. The subjects covered include socialization and the social environment, sustainable development, education and the transformation of society, the environment and its problems, Ghana's place in it, and its collaboration with other nations. The results of the recent qualitative analysis of the SHS Social Studies curriculum (GES, 2010) do not align with the findings of the study conducted by Opuni-Frimpong et al. (2022), which found that social studies and integrated science cover climate change

extensively and that it is a fundamental subject for all students. In their study, they compared the SHS Social Studies curriculum to subject such as Ghanaian Language, French, and History and among others in terms of their coverage of climate change issues so one would not be surprised to see such finding because these subjects have no issues regarding climate literacy.

Once more, it was found that the geography syllabus lacks sufficient themes on climate change in a study by Konadu (2014) that evaluated how well Ghana's senior high school geography curriculum meets the difficulties of climate change. This result corroborates the researcher's current content analysis of the senior high school Social Studies curriculum, which showed that the syllabus's coverage of climate-related concerns is insufficient. The Ghana Education Service (1990) emphasized that Social Studies include civics, geography, history, economics, government, and sociology in determining its scope. This definition suggests that geography is one of the main subjects covered in social studies, so it follows that if the geography curriculum does not adequately address climate-related difficulties, those issues will undoubtedly transfer into social studies. According to Kariuki (2017), the majority of curriculum in underdeveloped nations provide minimal information about climate change. The results of Kwenin's (2021) study, which showed that there are insufficient climate change issues at JHS, are similar with the conclusions of the current content analysis. Despite taking place at the junior high school level. This suggests that there is insufficient material on climate-related issues in the Social Studies curricula of junior high and senior high schools.

Interview Responses on the Climate Change Issues Covered in the Social Studies Curriculum

Teachers' views

The researcher surveyed Social Studies instructors to find out how they felt the SHS Social Studies program addressed climate change issues enough. Nearly all of the educators seemed to have similar things to say about how the curriculum doesn't include enough topics linked to climate change. As an example, teacher S in social studies stated;

I must admit that the SHS Social Studies syllabus does not cover enough climate change issues. Perhaps, the only topic that slightly touches on climate-related issue is Our Environment and Environmental challenges which is even a form 3 topic.

This claim is in line with the findings of Chew-Hung and Liberty (2017), who found that while climate change appears to have an impact on human activity on the environment, it is not explicitly mentioned in Singapore's Social Studies curriculum.

Another Social Studies teacher (teacher O) had this to say:

As for me, I think JHS Social Studies curriculum has more issues on climate change than that of the senior high school. At least, with the junior high school, issues such rainfall formation, land forms, vegetation and even climatic zones in Ghana are being discussed.

Another Social Studies teacher (teacher Q) expressed a similar opinion, saying that:

The goal of the social studies curriculum is to assist students in resolving both personal and societal difficulties. While there is less curricular

content on climate change, it is one of the issues facing society. In what way do you anticipate that students will be able to address concerns relating to climate change and other related topics.

The results of the study by Boaten and Boaten (2015), which found that the SHS Social Studies curriculum covers climate change topics insufficiently, are all supported by these responses. Despite the fact that curriculum at all educational levels is being used by nations to address the major global issue of climate change, the evidence that is currently available indicates that the Social Studies curriculum at the Senior High School (SHS) level does not adequately address these challenges. This is a significant problem since social studies examines how humans interact with their surroundings, and climate change is one environmental concern that has to be handled. Since Social Studies is defined by Michaelis (1953) as the study of man and his interactions with the physical and social environment, this is a critical issue that requires the attention of stakeholders.

Research Question 2: Social Studies Teachers' and Students' Level of Knowledge about Climate Change

The purpose of this section was to investigate the degree of climate change awareness among Social Studies instructors and students. The questions posed in Table 7 were taken from the literature in order to elicit answers from social studies instructors and students. Table 6 presents the specifics of the findings.

Table 6: Social Studies Teachers' and Students' Level of Knowledge about Climate Change

Statement	Mean	Standard Deviation
Climate change is the alteration of the world's climate.	4.89	.46
	3.75	1.34
Global warming is a sign of climate change.	4.37	.48
	3.85	1.13
Melting of ice is an indication of climate change.	4.63	.55
	3.40	1.25
Desertification is partly the result of climate change.	4.44	.63
	3.18	1.24
Change in the pattern of rainfall is as a result of climate Change.	4.50	.50
	4.08	1.32
Climate change is driven by human activities	4.63	.61
	3.55	1.32
Climate change is a natural phenomenon.	4.16	4.59
	3.42	1.33
Climate change is a worldwide phenomenon	4.57	.79
	3.53	1.20
Climate change is a local phenomenon	2.21	1.13
	3.67	1.16
Anything about the weather is climate change.	3.61	1.25
	3.48	1.19
Rise and fall in sea level are the result of climate change.	4.45	.500
	3.32	1.33

Source: Field survey, 2023

Where N=Total Number of Respondents, M= Mean and SD = Standard Deviation

The majority of instructors and students, according to Table 6 results, had high levels of knowledge, and as a result, they both agreed that climate change refers to changes in the global climate (M= 4.89, SD=.46 for teachers and students, and M= 3.75, SD= 1.34 for students). The findings also show that teachers and students worldwide concur that evidence of climate change is provided by global warming (M=4.37, SD=.48) and (M=3.85, SD=1.13), respectively. This viewpoint, which is in line with the theories advanced by international organizations such as the Intergovernmental Panel on Climate Change (IPCC, 2007) and the United Nations Framework Convention on

Climate Change (UNFCCC), is held by educators as well as pupils. For example, the IPCC defines "climate change" as the changes in Earth's climate that result from human activity such as burning fossil fuels, clearing forests, and other activities that increase the amount of greenhouse gases (GHG) in the atmosphere (IPCC Fourth Assessment Report, Working Group I, 2007).

Additionally, the majority of responders (M= 4.63, SD=.55) and (M= 3.40, SD= 1.24) concurred that melting ice is a sign of changing climate. This result is not unexpected because, as Hall (1995) notes, the Muir glacier has retreated extremely quickly since the Little Ice Age. O'hare, Johnson, and Pope (2005) state that between 1987 and 2003, melting caused the size of the ice and glaciers on the Rwenzori Mountains—which divide Uganda from the Democratic Republic of the Congo—to drop by half. They continued by suggesting that a decrease in cloud cover would have contributed to a faster rate of sublimation, or the process by which ice evaporates without first melting.

As confirmed by social studies teachers and students (M=4.63, SD=.61) and (M=3.55, SD=1.32), respectively, the United Nations Framework Convention on Climate Change (UNFCCC) defined climate change as the change that can be attributed directly or indirectly to human activity that alters the composition of the global atmosphere. Again, both Social Studies teachers' and students' (M=4.16, SD= .59) and (M=3.42, SD=1.33) assert that climate change is a natural phenomenon. These findings are subscribed to by the Anthropogenic and the non-Anthropogenic theories views on the causes of climate change.

From Table 6, more than half (M= 4.57, SD= .79) and (M= 3.53, SD= 1.20) of both the Social Studies teachers' and students agreed that climate

change is a worldwide phenomenon. This also in agreement with what the Intergovernmental Panel on Climate Change (IPCC) and the United Nations Framework Convention on Climate Change (UNFCCC) asserted. But one interesting revelation from the respondents was that majority of them disagreed (M= 2.21, SD= 1.13) and (M= 2.67, SD= 1.12) that climate change is local phenomenon. All these results are clear indications that the respondents have high level knowledge about climate-related issues. These results, however, go counter to those of Kwenin's (2021) study, which found junior high school Social Studies teachers know very little about issues relating to climate change. This suggests that a possible reason for the disparity in knowledge levels could be the lack of material about climate change in junior high teacher training programs.

Furthermore, compared to JHS Social Studies teachers, the SHS Social Studies teachers in the Cape Coast Metropolis have higher academic qualifications for teaching the subject (N=55; 61.2%), which may explain their superior level of climate change understanding.

Kwenin (2021) believes that teachers of Social Studies who possess understanding of climate-related issues can be attributed to their background in other courses. The high degree of climate change awareness among Social Studies students can be partially explained by the expertise of their teachers in the field (Council of Chief School Officers, 2011) or by the high caliber of instruction they receive (Cohen, Raudenbush, & Ball, 2003). Undang and Agus (2017) reiterated that students' educational attainment is a significant factor in determining their degree of climate change understanding and added that secondary school students have greater first-hand experience with the issue than

do elementary school students. This assertion is consistent with the findings of this study.

Interview Responses on Social Studies Teachers' Level of Knowledge about Climate Change

Teachers' Views

When asked about their degree of understanding regarding climate change, the majority of Social Studies instructors indicated that they had a high level of expertise.

I have read so many courses in geography during both my undergraduate and post-graduate studies in UCC and there were a lot of climate-related issues in most of the topics discussed. So, when it comes to climate change I can confidently say that I have up-to-date knowledge (teacher T).

A similar statement was made by another Social Studies teacher (teacher Q) that:

I have much interest in issues happening in the world more especially those related to climate and because of that I always listen to the news either on BBC or Al Jazeera every midnight to hear more on climate change.

In another breadth, (teacher S) had this to say:

Issues about climate change and other climate-related issues are everywhere and as a teacher of Social Studies I need to acquaint myself with these current issues so I have been following and reading these issues. In fact, I have even read the outcome of the Glasgow conference on climate change.

All these responses confirm from the teachers suggest that Social Studies within the Cape Coast Metropolis have adequate knowledge on climate change. From this, it can be concluded that Social Studies teachers' extensive knowledge of

climate change can benefit their students. This lends credence to Papadimitriou's (2002) assertion that pupils will learn more about climate change the better teachers understand it.

Research Question 3: Appropriate Methods Used by Social Studies Teachers in Teaching Climate-Related Issues in the Curriculum

This research question explored information from Social Studies teachers' and students' on the appropriate methods used by Social Studies in teaching climate-related issues in the curriculum. The details of the findings are presented in Table 7.

Table 7: Methods Used by Social Studies Teachers in Teaching Climate-Related Issues in the Curriculum

Statement	Mean	Standard Deviation
Students participate in problem-solving.	3.87	1.21
	3.86	1.21
Teacher involves students in discussing climate related issues.	4.39	.65
	4.01	1.06
Teacher uses Illustrated talks	3.12	1.31
	3.73	1.06
Students are engaged in role play	4.44	.62
	3.49	1.17
Teacher engages students in brainstorming.	4.39	.72
	3.68	1.14
Teacher makes use of resource person.	2.39	1.28
	2.04	.86
Students work in groups on different topics and prepare presentations.	3.79	1.32
	4.11	1.11

Source: Field survey, 2023

In Table 7, more than half (M= 4.44, SD= 0.62) and (M= 3.39, SD= 1.17) of the social studies teachers and students agreed that students engage in role-playing. For their part (Bonwell & Eison, 1991) found that students prefer role-playing techniques to traditional lectures and that these can have a

significant impact on their learning and the development of their thinking and writing skills. Martorella (2001) role-playing games are used in the classroom to teach students to solve problems effectively by selecting social problems to study. Paschall and Wstenhagen (2012) found that role-playing games are used to educate students on issues that are largely environmental or social in nature and require agreement between sovereign governments or different sectors. This is also confirmed by the study by Kwarteng (2022) that social studies teachers predominantly use role play methods when executing their lessons.

Again, from Table 7, majority (M= 3.86, SD= .65) and (M= 4.39, SD= 1.06) of both the Social Studies teachers' and students' agreed that students are involved in discussing climate related issues in the classroom. According to Amoah (1998), discussion techniques are employed in social studies instruction because they guarantee democracy in the classroom and help students accomplish the subject's overall goals. This is due to the fact that students are taught to respect other people's opinions, be understanding of one another, occasionally cooperate during discussions, and accept and assimilate the cultural diversity of others. Kwenin (2021), hints that Social Studies teachers mainly use the discussion technique because it promotes student participation in the classroom, puts them at the center of the learning process, guarantees that students' knowledge is retained, and makes learning relevant and practical.

Also, on the issue of the use of brainstorming method in teaching, majority (4.39, SD= .72) and (M= 3.68, SD= 1.14) of both the Social Studies teachers' and students' agreed on the statement. According to Omane-Akuamoah et al. (2004), brainstorming is a method for coming up with ideas or a range of solutions for an issue. Ikwumelu and Oyibe (2014) further opine that

brainstorming reinforces the fundamentals of social studies and brainstorming while providing students with the chance to learn from both their peers and failures. The study by Kwarteng (2022), which found that brainstorming is also used in the classroom by Social Studies teachers, supports the conclusions of this study.

Another interesting revelation about the findings from Table 8 was about the use of resource persons in teaching climate-related issues in Social Studies. Majority (M= 2.39, SD= 1.39) and (M= 2.04, SD= .86) of both the Social Studies teachers' and students disagreed on the statement. This implies that Social Studies hardly invite resources person to the classroom when teaching climate related issues. But Adu-Yeboah (2008) believes that there are people in the community who have specific skills that may be used to benefit learners. These people may be called upon to facilitate teaching and learning in the school.

Interview Responses on the Methods Used by Social Studies Teachers in Teaching Climate-Related Issues in the Curriculum

Teachers' Views

This section presents the results from interviews from Social Studies teachers. They were to indicate the recommended methods in the Social Studies curriculum for teaching climate-related issues. It appears almost all their responses were related and pointing to the fact that they use learner centered methods.

Teacher S has this to say:

As for me I believe that learners should be made to take the centre stage of the learning process so I mostly employ discussion, role play and brainstorming methods in teaching my lessons.

In a similar vein, teacher Q said:

I mostly employ interactive pedagogies such discussions, role play, and problem-solving methods in delivering my lessons in Social Studies. I am a 21st century teacher and these are demands of the century from a teacher.

Based on the current discussions, it can be inferred that learner-centered strategies are utilized by the majority of social studies teachers in the Cape Coast Metropolis when teaching about climate-related concerns in the classroom. According to Blumberg (2012), learner-centered education gives students the chance to complete a genuine task while also developing critical competencies and 21st century abilities. According to Johnson (2013), the application of learner-centered techniques positions teachers as facilitators and puts them in a position where they may push students academically to enhance their learning. Because teachers only need to guide students' mental processes, their workload is reduced. He went on to say that it promotes student cooperation since it allows them to share what they've learned with one another.

Research Question 4: How the SHS Social Studies Curriculum Prepares SHS Students to Respond to the Challenges of Climate Change

Children and young people are the least to be blamed for climate change, but they will bear the brunt of its consequences. As a result, it is vital that the curriculum and national policies be designed to prepare students to respond to climatic challenges (UNESCO, 2021). The researcher sought to explore the

views of Social Studies teachers' and students' about how the Social Studies curriculum prepares SHS students to respond to the challenges of climate change. The details of the findings are presented in Table 8.

Table 8: How the SHS Social Studies Curriculum Prepares SHS Students to Respond to the Challenges of Climate Change

Statement	Mean	Standard Deviation
Engaging students in practical works.	4.75	.44
	3.92	1.16
Asking students to observe the things in their environment issues relating to climate change	3.97	1.05
	4.05	1.04
Attending climate workshops and conferences.	4.72	.45
	3.15	1.39
Inviting a resource person to talk to students about climate issues relating to climate change	4.82	.39
	3.47	1.44
Showing documentaries on climate change	4.31	.51
	3.85	2.08
Asking students to read about climate issues in books	4.82	.39
	3.88	1.10
Debating climate related issues.	4.72	.45
	3.55	1.23
Asking students to listen to news on issues about climate change	3.79	1.32
	3.89	1.13
Embarking on fieldwork	3.73	1.06
	3.56	1.29

Source: Field survey, 2023
Where M= Mean and SD = Standard Deviation

Results from Table 8 indicate that majority of the teachers' and students' (M= 4.81, SD= .39) and (M= 3.88, SD= .39) for teachers' and students' respectively agreed that reading climate issues in books can help adequately prepare students to respond to climate change issues, hence, they agreed that reading books can help prepare student to meet climate change issues. Books on climate change provide a powerful source of information for creating awareness in children about climate change and modifying children's attitudes

towards the environment (Hicks, 2014, p.5). Beach, Share, and Webb (2017) share in this sentiment by hinting that climate change books provides climate change information that are relevant to students and also gives teachers tools and teaching ideas to support them incorporate climate change ideas into their own classrooms.

The results from Table 8 further indicate that both teachers' and students' agreed that attending climate workshops and conferences will be a helpful way preparing students to respond to climate change issues (M=4.37, SD= .48) and (M= 3.85, SD= 1.13) respectively. Climate change workshops and conferences are seen as effective way of equipping students with climate change issues and preparing them to become globally competent citizens (Vaccari, & Gardinier, 2019).

Again, from Table 8, majority of the respondents (M= 4.31, SD= .51) and (M= 3.85, SD= 2.1) for teachers' and students' respectively agreed that showing documentaries on climate change is another way of preparing students to respond to the challenges of climate change. When students are taught with videos they become highly motivated and develop experience and genuine interest in climate change issues (Gold et al., 2015). Markowitz et al. (2018) indicated that when students are taught with visual reality it increases their understanding or curiosity about climate science, as well as becoming more positive views toward the environment.

Furthermore, majority of the respondents (M= 4.82, SD= .39) and (M= 3.47, SD= 1.44) for teachers' and students' respectively agreed that inviting a resource person to talk to students about climate issues relating to climate change. This is consistent with the assertion by Adu-Yeboah (2008) that

resource persons are well-versed or skilled in a particular area of learning or experience and may be called upon to facilitate teaching and learning.

Interview Responses by Social Studies Teachers on the SHS Social Studies Curriculum Prepares SHS Students to Respond to the Challenges of Climate Change

Teachers' Views

This section presents the results on interviews from Social Studies teachers. They were asked to indicate how the Social Studies curriculum prepare students to respond to climate change. The responses from most of the teachers are related that resource persons, the use of videos, reading material on climate change and watching documentaries on climate change as means of preparing students to respond to climate change issues. For instance, one interviewee remarked that:

In my opinion, I think Social Studies students should be exposed to more climate change videos on either YouTube or in the classroom (Teacher S).

In a similar direction, another interviewee indicated that:

Books on climate change can foster deeper understanding to students and they can refer to them at any point in time in their life (Teacher O).

Teacher Q also said:

Though I have much knowledge about climate change, I think when we invite resource persons to speak to students on climate change it be of great benefit and also give me the opportunity to learn and unlearn.

It can be inferred from the responses that Social Studies education is preparing students to respond to the challenges of climate change by encouraging them to read climate related materials, attending conferences and

workshops on climate change as well as inviting resource persons to the classroom to share their rich experiences with the students. All these are aimed at making students agents of change in their society and also contribute to solving climate change and its related challenges in the society and the world at large.

Research Question 5: What are Social Studies Teachers' and Students' Views on the Challenges of Social Studies Curriculum in Responding to Climate Change Issues

The section aimed at finding out from Social Studies teachers' and students' on their views on the challenges of Social Studies education in responding to climate change issues. Table 9 presents the details of the responses by the respondents.

Table 9: Social Studies Teachers' and Students' Views on the Challenges of Social Studies Education in Responding to Climate Change Issues

Statement	Res	Mean	Standard Deviation
Inadequate teaching resources	T	4.44	.73
	S	3.49	1.28
Less conducive classrooms.	T	4.23	.92
	S	3.26	1.28
Poor funding of Social Studies education in Ghana.	T	4.23	1.01
	S	3.47	1.2
Lack of teacher competency in teaching Social Studies.	T	1.76	.55
	S	2.88	1.29
Inadequate content to cover climate change topics.	T	4.56	.49
	S	3.33	1.21
Difficulty in using integrated approach to teach Social Studies.	T	1.77	.89
	S	2.04	.86
Teachers' inability to complete the syllabus.	T	3.09	1.64
	S	3.43	1.32
Abstract nature of the concept of climate change.	T	4.46	.87
	S	3.44	1.21
Lack of well-furnished Social Studies laboratory.	T	4.86	.35
	S	3.64	1.34

Source: Field survey, 2023

Where M= Mean and SD = Standard Deviation

Results from Table 9 indicate that more than half of the respondents (M= 4.44, SD= .73) and (M= 3.49, SD= 1.28) for teachers' and students' respectively agreed on the statement that inadequate teaching resources is a challenge as far as the teaching of climate-related issues is concern, Social

Studies education responding to climate change issues are concern. Learning may also occur dependent on what is being taught and the setting position in which it was performed. However, when teaching is done correctly with the help of instructional materials, substantial learning is stated to have occurred and subject retention is effectively boosted. On their part, Onyekachukwa et al. (2015), are of the view that learning can be made less tiresome and more functional when one makes efforts to locate and make liberal use of instructional resources but their absence may greatly affect it. In the words of Edinyang, Ejoh and Adams (2020) any teaching performed without the use of instructional materials is said to be incorrect.

Moreover, Table 9 shows that more than half of the respondents (M= 4.44, SD= .73) and (M= 3.49, SD= 1.28) for teachers' and students' respectively agreed that teachers' inability to complete the syllabus is a challenge to Social Studies in responding to climate change issues. Content analysis of the 2010 Social Studies curriculum revealed that there are insignificant climate change issues in the curriculum and the topic that is likely to cover some issues on climate change is taught in form 3. Therefore, if teachers are not able to complete lessons on the few climate change related issues in the syllabus, it raises some concerns.

Again, the results indicate that most of the respondents (M= 4.56, SD= .49) and (M= 3.33, SD= 1.21) for teachers' and students' respectively agreed to the statement that there is inadequate content to cover climate change topics. This finding is consistent with that of Bakar (2015) that the climate changes issues in the Social Studies curriculum is inadequate.

Interview Responses on Social Studies Teachers' Views on the Challenges of Social Studies Curriculum in Responding to Climate Change Issues.

Teachers' Views

This section presents the results on interviews from Social Studies teachers. They were asked to indicate their views on the challenges of Social Studies education in responding to climate change issues. The responses from most of the teachers are related to either inadequate funds or resources or inability to complete the syllabus.

For instance, in the words of teacher Q, he said

Sometimes the resources to teach topics may be lacking and it makes it difficult.

Again, teacher S indicated that:

The resources to help me teach are not there so I mostly teach without any resource.

Pre-testing the questions improved their validity and helped users become accustomed to the process of collecting data. The instrument's dependability was evaluated with the aid of the pilot testing results, which comprised fifty (50) Form 3 SHS students from Nyankumasi Ahenkro Senior High School in the assembly of the Assin South District and ten (10) Social Studies instructors. A qualitative content analysis of the SHS Social Studies curriculum (GES 2010) was used to investigate the first research question. The data pertaining to research questions two, three, four, and five were analysed using frequency counts, percentages, averages, and standard deviations.

Summary of Chapter

The results in relation to research question 1 indicate that senior high schools of have inadequate information on climate-related issues. Again, with

respect to research question 2, results are clear indications without any reasonable doubt that both the Social Studies teachers' and students' have high level knowledge about climate-related issues. It was also revealed that their level of knowledge on climate-related issues may be attributed to the knowledge they have acquired from other subjects other than Social Studies. Again, the study showed that majority of the Social Studies teachers' in the Cape Coast Metropolis employed learner-centered methods of teaching. The study also revealed that Social Studies can prepare to students to respond to the challenges of through climate change conferences and reading books on climate change. Finally, the study identified that teaching learning resources and inadequate climate change content in the Social Studies curriculum.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

This is the final chapter of the research. It provides a summary of the study to highlight the methodologies adopted in gathering and analysing data in order to come out with the main findings. Based on the main findings, conclusions are reached to permit the provision of appropriate recommendations to address the research questions formulated. Suggestions were also made for further research.

Summary of the Research Process

This section has two sections. The research methodology is outlined in the first section, while the important findings and recommendations for additional research are summarized in the second. This study's primary goal was to determine how well SHS Social Studies curricula address topics connected to climate change. Five research questions served as the study's guidelines. This study collected and analyzed data using both quantitative and qualitative techniques survey designs. There were 320 pupils and 87 teachers in the study's total population of 407, from which data were collected.

An interview guide and questionnaires were employed in the study. The measurement was done using a 5-point Likert-type scale: 1 = strongly disagree, 4 = agree, 3 = unclear, and 5 = strongly agree. Because the Likert scale allowed my interviewees to express how much they agreed with a given proposition, that is how the items were designed. Respondents can indicate on the 5-point scale that they are unsure about any given ambiguous statement.

Pre-testing the questionnaires helped to increase their validity and familiarize users with the procedure of gathering data. The results of the pilot testing, which included 10 Social Studies instructors and fifty (50) Form 3 SHS students from Nyankumasi Ahenkro Senior High School in the Assin South District assembly, helped assess the instrument's reliability. The first research issue was examined via a qualitative content analysis of the SHS Social Studies curriculum (GES 2010). We used frequency counts, percentages, averages, and standard deviations to analyse the data related to research questions two, three, four, and five.

Summary of Key Findings

In accordance with the results presented in chapter four, the following major findings of the study were identified:

How Adequate does the SHS Social Studies Curriculum Covers Climate Change Issues

The study found out that the SHS Social Studies curriculum does not adequately cover climate change issues such as definition, causes, effects, and mitigation measures of climate change.

Social Studies Teachers' and Students' Level of Knowledge About Climate Change

The study found that the majority of respondents (teachers and students) have a high level of knowledge about climate change.

Methods for Teaching Climate-related Issues in the Social Studies Curriculum

The result showed that most Social Studies Teachers in SHS in Cape Coast Metropolis use learner-centred methods such as role-play, brainstorming

and discussion to convey climate-related issues in the classroom. These methods offered Social Studies students the opportunity to actively participate in class.

How the SHS Social Studies Curriculum Prepares SHS Students to Respond to the Challenges of Climate Change

The results showed that Social Studies curriculum prepares to students to respond to the challenges of through watching videos and reading books on climate change, attending climate conferences, and encouraging students to observe things in their environment.

Social Studies Teachers' and Students' Views on the Challenges of Social Studies Education in Responding to Climate Change Issues

The respondents of the study indicated that inadequate teaching materials, inadequate climate change in the syllabus, poor funding of Social Studies education and teachers' inability to complete the syllabus were identified as the major challenges of Social Studies education's response to climate change.

Conclusions

From the results of this study, the following conclusions were drawn: First, on the adequacy of the Social Studies curriculum in addressing climate change issues it was discovered through the qualitative content analysis that the syllabus covered insufficient climate change issues. The researcher concluded that the because the Senior High School Social Studies curriculum contained inadequate climate change issues it may not be able to equip the students with the requisite knowledge, attitude and skills to deal with climate change issue.

Again, with respect to the level of knowledge of Social Studies teachers and student on climate change, it was concluded that Social Studies teachers' and students in SHS in the Cape Coast Metropolis had high level knowledge. However, their current level of knowledge is not attributed to the Social Studies curriculum rather to other courses. The result that Social Studies teachers possess high level of knowledge about climate change may emanate from the fact that the integrated nature of Social Studies transcends to their teacher preparation where they are made to read courses from other disciplines of knowledge. Their high level of knowledge may culminate into high level of campaign and awareness to other citizens. Hence, diffusing knowledge about climate change

Furthermore, Social Studies teacher's employed employ learner centered methods in delivering climate related-issues in the classroom. Since the methods are learner-centred, learners may stand a higher chance of understanding and internalizing what is being taught in relation to climate change.

Again, the researcher concludes that Social Studies curriculum prepares students to respond to climate change challenges is through interactive approaches by engaging the learners to experience and observe climate change issues in real life. This will equip them with needed skills, knowledge and values needed to solve climate change related issues.

Finally, the researcher concluded that the Social Studies curriculum is not able to fully respond to climate change due a number of factors and if these factors are not dealt with climate change and its attendant challenges will continue to persist.

Recommendations

From the key findings and the conclusions drawn from the study, the following recommendations are made;

1. Social Studies curriculum developers for Senior High Schools in the country should seek to make sure that climate change is adequately covered in a very comprehensive manner in the Social Studies curriculum at the Senior High School level. It is also recommended that the National Climate Change Committee (NCCC), in charge of National Climate Change Policy (NCCP) in Ghana, together with the Ministry of Education through NaCCA should set up committee to further evaluatethe SHS curriculum and improve upon it by fusing more climate change information such as evidence, causes, effects, mitigation measures into it.
2. Social Studies teachers' teachers and students should be encouraged to continually update their knowledge about climate by attending climate change conferences and workshops because information about change keep evolving and they need to be breast with current information.
3. Social Studies teachers should be encouraged to explore other methods which are relevant in teaching climate change issues such as field trips, demonstrations and illustrated talks.
4. Social Studies teachers should be encouraged to explore other relevant ways of preparing students to respond to climate change issues such as teaching students about the adaptation strategies of climate change, how to minimize human activities that contribute to climate change.

5. Stakeholders' of education, old students, and other NGO's should support the schools within the Cape Coast Metropolis in terms of acquisition of teaching and learning resources to enhance the teaching and learning to help make Social Studies responsive to climate change. Photographs, textbooks on climate change, videotapes, computers, projectors and internet access should be made available to the schools.

Suggestions for Further Studies

As a result of the crucial nature of climate change and its related challenges, the researcher suggests that similar study be conducted at the colleges of education in Ghana.

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APPENDICES

APPENDIX A

QUESTIONNAIRES FOR TEACHERS

UNIVERSITY OF CAPE COAST
DEPARTMENT OF BUSINESS AND SOCIAL SCIENCES EDUCATION

CLIMATE CHANGE QUESTIONNAIRE FOR SOCIAL STUDIES TEACHERS

Dear Respondent,

This questionnaire is part of a research work that seeks to explore the adequacy of the Senior High School Social Studies Curriculum in meeting the Challenges of Climate Change. You are kindly requested to read through the items and respond to them as frankly as possible. You have the right to refrain from any particular question, a group of questions or the entire questionnaire without any consequence. Also, your responses will be treated as purely confidential and be used solely for academic purposes. Do not write your name on the questionnaire. Thank you for taking your time to help in this research.

Informed Consent

I have read and understood the information above and willingly agree to complete the questionnaire under the stated conditions. Please, **tick (√)** the box at the end of the statement if you agree to participate in the study. [ ]

SECTION A
DEMOGRAPHIC DATA

Instruction; please answer the following questions by writing or ticking **(√)** where appropriate.

SECTION A

BACKGROUND INFORMATION OF PARTICIPANT

Please, tick **(√)** or write where appropriate.

1. Name of School …….
2. Sex Male [ ] Female [ ]
3. How old are you?

   Under 25 [ ] 25 – 29 [ ] 30 – 34 [ ] 35 – 39 [ ] 40+ [ ]
4. What is your highest level of formal education? ……...
5. Working/teaching experience……
6. Do you hold a degree from an academic/teacher education institution in a discipline related to Social Studies Education?

   Yes [ ] No [ ]
7. If Yes, please name them.

   a. ……

   b. ……

   c. ……

   d. ……
8. For how many years, including the present year, have you been teaching Social Studies

   ……

SECTION B

SOCIAL STUDIES TEACHERS' LEVEL OF KNOWLEDGE ABOUT CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
9. Climate change is the alteration of the world's climate.					
10. Global warming is a sign of climate change.					
11. Melting of ice is an indication of climate change.					
12. Desertification is partly the result of climate change.					
13. Change in the pattern of rainfall is as a result of climate Change.					
14. Climate change is driven by human activities.					
15. Climate change is a natural phenomenon.					
16. Climate change is a worldwide phenomenon.					
17. Climate change is a worldwide phenomenon					
18. Anything about the weather is climate change.					
19. Rise and fall in sea level are the result of climate change.					

20. Others please, specify ……

SECTION C

METHODS EMPLOYED BY SOCIAL STUDIES TEACHERS IN TEACHING CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
21. Students participate in problem-solving.					
22. Teacher involves students in discussing climate related issues.					
23. Teacher uses Illustrated talks.					
24. Students are engaged in role play.					
25. Teacher engages students in brainstorming.					
26. Teacher makes use of resource person.					
27. Students work in groups on different topics and prepare presentations.					

28. Others please, specify ……..

SECTION E

SOCIAL STUDIES TEACHERS' VIEWS ON THE CHALLENGES OF SOCIAL STUDIES EDUCATION IN RESPONDING TO CLIMATE CHANGE ISSUES

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
29. Inadequate teaching resources.					
30. Less conducive classrooms.					
31. Poor funding of Social Studies education in Ghana.					
32. Lack of teacher competency in teaching Social Studies.					
33. Inadequate content to cover climate change topics.					
34. Difficulty in using integrated approach to teach Social Studies.					
35. Teachers' inability to complete the syllabus.					
36. Abstract nature of the concept of climate change.					
37. Lack of well-furnished Social Studies laboratory.					

38. Others please, specify ……

SECTION E

ACTIVITIES IN THE SOCIAL STUDIES CURRICULUM THAT PREPARE SHS STUDENTS TO RESPOND TO THE CHALLENGES OF CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
39. Engaging students in practical works.					
40. Asking students to observe the things in their environment issues relating to climate change					
41. Attending climate workshops and conferences.					
42. Inviting a resource person to talk to students about climate issues relating to climate change					
43. Showing documentaries on climate change					
44. Asking students to read about climate issues in books					
45. Debating climate related issues.					
46. Asking students to listen to news on issues about climate change					
47. Embarking on fieldwork					

48. Others please, specify ……

APPENDIX B

QUESTIONNAIRES FOR STUDENT

UNIVERSITY OF CAPE COAST

DEPARTMENT OF BUSINESS AND SOCIAL SCIENCES EDUCATION

CLIMATE CHANGE QUESTIONNAIRE FOR SOCIAL STUDIES STUDENTS

Dear Respondent,

This questionnaire is part of a research work that seeks to explore the adequacy of the Senior High School Social Studies Curriculum in meeting the Challenges of Climate Change. You are kindly requested to read through the items and respond to them as frankly as possible. You have the right to refrain from any particular question, a group of questions or the entire questionnaire without any consequence. Also, your responses will be treated as purely confidential and be used solely for academic purposes. Do not write your name on the questionnaire. Thank you for taking your time to help in this research.

Informed Consent

I have read and understood the information above and willingly agree to complete the questionnaire under the stated conditions. Please, **tick (√)** the box at the end of the statement if you agree to participate in the study. [ ]

SECTION A

DEMOGRAPHIC DATA

Instruction; please answer the following questions by writing or ticking **(√)** where appropriate.

1. Age as at last birthday

12-14 years	[ ]
15-17years	[ ]
17years and above	[ ]

2. Name of School

……

3. Form

Form 2 [ ]

Form 3 [ ]

4. Sex

Male [ ]

Female [ ]

SECTION B

SOCIAL STUDIES STUDENTS' LEVEL OF KNOWLEDGE ABOUT CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
1. Climate change is the alteration of the world's climate.					
2. Global warming is a sign of climate change.					
3. Melting of ice is an indication of climate change.					

4. Desertification is partly the result of climate change.					
5. Change in the pattern of rainfall is as a result of climate Change.					
6. Climate change is driven by human activities.					
7. Climate change is a natural phenomenon.					
8. Climate change is a worldwide phenomenon.					
9. Climate change is a worldwide phenomenon					
10. Anything about the weather is climate change.					
11. Rise and fall in sea level are the result of climate change.					

12. Others please, specify ……..

SECTION C

METHODS EMPLOYED BY SOCIAL STUDIES TEACHERS IN TEACHING CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
13. Students participate in problem-solving.					
14. Teacher involves students in discussing climate related issues.					
15. Teacher uses Illustrated talks.					
16. Students are engaged in role play.					
17. Teacher engages students in brainstorming.					
18. Teacher makes use of resource person.					
19. Students work in groups on different topics and prepare presentations.					

20. Others please, specify
……..

SECTION E

SOCIAL STUDIES STUDENTS' VIEWS ON THE CHALLENGES OF SOCIAL STUDIES EDUCATION IN RESPONDING TO CLIMATE CHANGE ISSUES

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
21. Inadequate teaching resources.					
22. Less conducive classrooms.					
23. Poor funding of Social Studies education in Ghana.					
24. Lack of teacher competency in teaching Social Studies.					
25. Inadequate content to cover climate change topics.					
26. Difficulty in using integrated approach to teach Social Studies.					
27. Teachers' inability to complete the syllabus.					
28. Abstract nature of the concept of climate change.					
29. Lack of well-furnished Social Studies laboratory.					
30. Abstract nature of the causes of climate change.					

31. Others please, specify

……

SECTION E

HOW THE SOCIAL STUDIES CURRICULUM THAT PREPARE SHS STUDENTS TO RESPOND TO THE CHALLENGES OF CLIMATE CHANGE

The statement below represents the level of agreement or disagreement. Please tick **(√)** the columns which represent your view on the statement. SD= Strongly Disagree, D= Disagree, Undecided= U, A= Agree, SA= Strongly Agree

Statement	SD	D	U	A	SA
32. Engaging students in practical works.					
33. Asking students to observe the things in their environment issues relating to climate change					
34. Attending climate workshops and conferences.					
35. Inviting a resource person to talk to students about climate issues relating to climate change					
36. Showing documentaries on climate change					
37. Asking students to read about climate issues in books					
38. Debating climate related issues.					
39. Asking students to listen to news on issues about climate change					
40. Embarking on fieldwork					

41. Others please, specify

……..

APPENDIX C

INTERVIEW GUIDE FOR TEACHERS

UNIVERSITY OF CAPE COAST

FACULTY OF HUMANITIES AND SOCIAL SCIENCES EDUCATION

DEPARTMENT OF BUSINESS AND SOCIAL SCIENCES EDUCATION

Date of the interview……

SECTION A

BACKGROUND INFORMATION OF PARTICIPANT

Please, tick **(√)** or write where appropriate.

49. Name of School …….

50. Sex Male [ ] Female [ ]

51. How old are you?

Under 25 [ ] 25 – 29 [ ] 30 – 34 [ ] 35 – 39 [ ] 40+ [ ]

52. What is your highest level of formal education? ……...

53. Working/teaching experience……

54. Do you hold a degree from an academic/teacher education institution in a discipline related to Social Studies Education?

Yes [ ] No [ ]

55. If Yes, please name them.

a. ……

b. ……

c. ……

d. ……

56. For how many years, including the present year, have you been teaching Social Studies

…….

SECTION B

METHODS EMPLOYED BY SOCIAL STUDIES TEACHERS IN TEACHING CLIMATE CHANGE

57. Name **four** methods recommended by the Social Studies syllabus in teaching climate change.

a. ……

b. ……

c. ……

d. ……

SECTION C

SOCIAL STUDIES TEACHERS' VIEWS ON THE CHALLENGES OF SOCIAL STUDIES EDUCATION IN RESPONDING TO CLIMATE CHANGE ISSUES

58. Name any **four** challenges that hinder the effective responds of the Social Studies education to climate change issues.

a. ……

b. ……

c. ……

d. ……

SECTION D

ACTIVITIES IN SHS SOCIAL STUDIES CURRICULUM THAT PREPARE SHS STUDENTS TO RESPOND TO THE CHALLENGES OF CLIMATE CHANGE

59. State **four** activities in the Social Studies curriculum that prepares students to respond to the challenges of climate change

a. ……

b. ……

c. ……

d. ……

APPENDIX D

INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF HUMANITIES & SOCIAL SCIENCES EDUCATION
DEPARTMENT OF BUSINESS & SOCIAL SCIENCES EDUCATION

Telephone: +233209408788
Ext.: (268), Direct: 35411
Telegrams & Cables: University, Cape Coast
E-mail: dbsse@ucc.edu.gh

UNIVERSITY OF CAPE COAST
PRIVATE MAIL BAG

Our Ref:

Your Ref:

17th April, 2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

INTRODUCTORY LETTER

Mr. Collins Ato Anobil is an Mphil (Curriculum and Teaching) student of the Department of Business and Social Sciences Education, and as a requirement for the programme, he is working on the research topic: **"Adequacy of the Senior High School Social Studies Curriculum in Meeting the Challenges of Climate Change."**

The study seeks to examine the adequacy of the Senior High School Social Studies Curriculum in meeting the challenges of climate change.

We would be glad if you could give him the needed assistance to undertake data collection.

In case he flouts any ethical requirement as the study may necessitate, kindly get in touch with his supervisor, Rev. Prof. Kankam Boadu or through e-mail Kankam.boadu@ucc.edu.gh. You may also get in touch with the Department on 0209408788 or through dbsse@ucc.edu.gh.

Thank you.

Yours faithfully,

For:

DR. ERIC MENSAH
HEAD OF DEPARTMENT