

Climate Change Knowledge and Awareness Creation in Relation to the Media among Senior High Students in Birim Central Municipal, Ghana.

Emmanuel Awusi¹, Kofi Asare²

¹Department of Environmental Science, Garden City University College, Kumasi, Ghana

²Business School, GIMPA, Accra, Ghana

Abstract: *Climate change has become one of the major Environmental problems facing the world today and the media has been central in making public the distressing evidence of a wide range of its implications on Agriculture, Ecosystems and health. Climate change knowledge and awareness creation are essential for successful adaptation and mitigation. The present study was conducted in the Birim Central Municipal, Ghana, and 400 Senior High Students were randomly selected from five schools. Both closed and open-ended questionnaire was used to assess students' knowledge on climate and their participation in climate change awareness creation. The results revealed that, despite the flourishing media environment Senior High Students in Birim Central Municipal have low climate change knowledge level. Also, there was no statistically significant difference in the level of climate change knowledge with respect to gender, age and the main source of information about climate change. Again, it was found that Senior High School students' involvement in climate change awareness creation is low, and there is a positive relationship between students knowledge level and awareness creation. Implications of the findings on educational curricula, policies and research have been discussed.*

Keywords: *Awareness creation, Climate change, knowledge*

I. Introduction

Climate change is one of the greatest challenges for humanity and the environment (Harbinson *et al.*, 2006), and it is one of the key challenges to the development of the world (UNDP, 2007). There is the evidence that, rapid climate changes are taking place due to human activities (IPCC, 2001). Although, there are natural causes of climate change, it is largely caused by anthropogenic activities such as the combustion of fossil fuel, industrial pollution, deforestation and land use changes (IPCC, 2007; Weart, 2010). The combustion of fuel and industrial pollution increase the concentration of green house gas in the atmosphere (Canadel, *et al.*, 2010), while deforestation and land use change interfere with the absorption of carbon by terrestrial sinks (IPCC, 2007) leading to global warming.

Climate change is of variety of effects, such as rising sea level, desertification, extinction of plant and animal species, shifting of agriculture patterns, and changes in the occurrence of extreme weather (IPCC, 2001; Pitpitunge, 2013). The effect of climate change on crop farming may be different from animal production (Masese *et al.*, 2016) such that it may be favorable to one but unfavorable to the other (IPCC, 2007). The change in rainfall pattern had led to a reduction in soil moisture and hence, a disruption of Agricultural sector. Thus, climate change becomes a concern of international organizations and governmental institutions because of its impacts on different sectors such as agriculture, ecosystem and biodiversity (IPCC, 2007). Climate change has resulted in cases of environmental catastrophes in Africa (Ofei-Nkansah, 2013; The World Bank Group, 2013), and Ghana has not been left out of these (Badu-Agyei, 2012; Boadi, 2013; Kunateh, 2013). Global climate change is therefore a topic of major public interest, not only because its impacts will impinge on many areas of our lives but also because a range of options is available to tackle the causes of the problem.

The 21st century is characterized by a high level of scientific and technical complexities of environmental issues such as climate change (Spellman, 2003). Thus, there is the need for a reasonable level of public scientific literacy as a necessity (Sjoberg, 1997), and this will make the general public good citizens who are in the position to make informed and more accurate decision about scientific issues (Kolstoe, 2000). Education is one of the recommended methods to find solution to the climate change menace (Anderson, 2010; Cherry, 2011; Sharma, 2012). Climate change education, including climate change science and knowledge is one of the climate change initiatives (UNESCO, 2010). Also, Science education on climate change contributes to students' knowledge and competence to adapt and respond to the problem (UNESCO, 2010). Students play important roles in the education on climate change by explaining complex scientific issues to the citizens of their community, and this will partly depend on their Knowledge on climate change. Also, students' involvement in environmental education leads to awareness creation for an individual to understand himself and his

immediate environment (Ali, 2015). Accordingly, science is taught at all levels of education in Ghana except at the pre-school to equip the students solve environmental problems (Boakye, 2014). Thus climate change education leads to awareness creation, and total behavioural and attitudinal change towards sustainable development (Ochieng, 2013)

Public knowledge on climate change has been studied by a lot of researchers (Berk and Schulman, 1995; Fortner et al.,2000; Acquah, 2011; Adebayo et al., 2013) However, most studies on climate change knowledge have focused on specific groups of the population such as tertiary students (Oruonye, 2011;Olajide et al., 2011; Spellman, 2013 ; Gameda & Akalu, 2015). Other studies also targeted at pre- tertiary students (Boyes and Stanistreet, 1997 ; Owolabi, et al., 2012), and concentrated on conception and perception of climate change. A search through the literature indicates that very little has been done to investigate the level of Senior High students' knowledge on climate change and students participation in climate change awareness creation. Using the Birim Central Municipality in the Eastern Region of Ghana as a reference point, this present study was therefore carried out to help address this lacuna. The main aim was to assess the level of knowledge of Senior High Students on climate change and students participation in public climate change education or awareness creation. Three hypotheses that were tested in the study were: that the level of knowledge of Senior High Students on climate change is high; that gender, age and sources of information on climate change have any link with knowledge about climate change; and that there is correlation between student's climate change knowledge and public awareness creation. The outcome, the authors believe, would go a long way in helping policy makers and stakeholders in the educational sector to identify the shortfalls in climate change science education and subsequently incorporate them in their curriculum. The findings may also be useful to appropriate authorities attempting to initiate the campaign for climate change awareness creation.

II. Methodology

This present study was carried out in the Birim Central Municipal, located within the Eastern Region of Ghana, with Akyem Oda as its capital. It lies between latitudes 05° 55' 29.89" N and longitude 00° 58' 55.78" W of Ghana (fig 1.) It has a total land area of 1,090Km². The municipality is characterized by a monthly mean temperature around 26 °C, and ranges between 21 °C and 35 °C. It experiences two rainfall seasons annually. The major season starts in April and ends in July, while the minor season begins in September and ends in early November. The Municipal is made up of both urban and peri- urban settlements with a population of 144,869 representing about six percent of the Eastern region's total population (Ghana Statistical Service,2014). It has five Government Senior high schools.

The survey was conducted in February 2016, and a total of 400 randomly selected respondents, (students) from five senior high schools in the Birim Central Municipality were used for this survey. The study evaluated students' general knowledge on climate change, and their participation in climate change awareness creation . A semi- structured questionnaire was used in this study, and the reliability of the of the questionnaires was assessed by pretesting 100 questionnaires in one of the schools with similar characteristics as those in the target study area. The scale consists of 50 climate change related statements which were adapted from both the Junior High School and Senior High School Integrated Science text books,(Entsua-Mensah et al.,2009; Kom-Zuta, 2012a; Kom-Zuta 2012b; Kom-Zuta, 2012c) . For each statement, respondents were asked to indicate whether the statement was 'true', 'false' or 'did not know'. These answers represent the three states 'informed', 'misinformed' and 'uninformed'. Correct scores were given +1, incorrect scores - 1 and 'did not know' was given '0'. A summative approach was used to find the total round score. Respondents were asked to indicate their main source of any information they have on climate change, and were also asked to state, whether or not they have participated in climate change awareness creation. Personal details such as age, sex, and year in Senior High School were obtained from students. Data collected was analyzed using the Statistical Package for Social Sciences (SPSS).

In our study, 58(14%) of respondents were found in the age category 12-15 years, 280(70%) in the 16-18 years category, and 62 (16%) were 19 years and above (Table 1). The highest proportion (70%) of respondents in the 16-18 years category was anticipated because, this is the age at which majority of students in Ghana are in the Senior High School. Most Ghanaian students enter the Senior High Schools by age 16 years where they spend three years up to age 19 years, with the first 11 years of their education(Age 5-15) being free and compulsory Basic Education (GES, 2014). The age bracket of the majority of the respondents is similar to that of Carr (2015) on climate change study in a Dar es Salaam, where majority(74%) of surveyed students were between the ages of 14 and 17.

Secondary school students obtain information on climate change from a broad range of sources (Carr, 2015). According to the respondents in the Birim Central Municipality, their main sources of climate change information were the electronic media, 168 (42%), the print media, 96(24%), and others like text books and teachers, 136 (34%) (Table 2 and Fig. 3 below).These results broadly reflect the findings of Olayinka et al., (2013) on study in Nigeria, where the print media and electronic media are the most dominant ways of receiving information on climate change. Nigatu et al., (2014) also had similar results where, most (63.1%) of the study participants identified electronic mass media (TV and radio) as their most common source of information about climate change. The major source of information on climate change being the electronic media in this study would probably imply that, the integration of climate change topics in different subjects is still inadequate (Calvo and Apilado,2015). Although the electronic media served as the major source of information on climate change in this study, the level of discussion on climate change on radio and television is low, and this limits the amount of information relayed to the public (Twum -Barimah et al., 2015).

Table 2: The distribution of main source of information on climate change and respondents participation in climate change awareness creation.

		Frequency	Percentage (%)
Main source of information on climate change n=400	Print media	96	24
	Electronic media	168	42
	Others	136	34
Participation in climate change awareness creation n=400	Yes	124	31
	No	276	69
Method used in the climate change awareness creation n=124	Posters	25	20
	Banners	9	7
	Videos	35	28
	Petition	5	4
	Drama	36	29
	Others	15	12

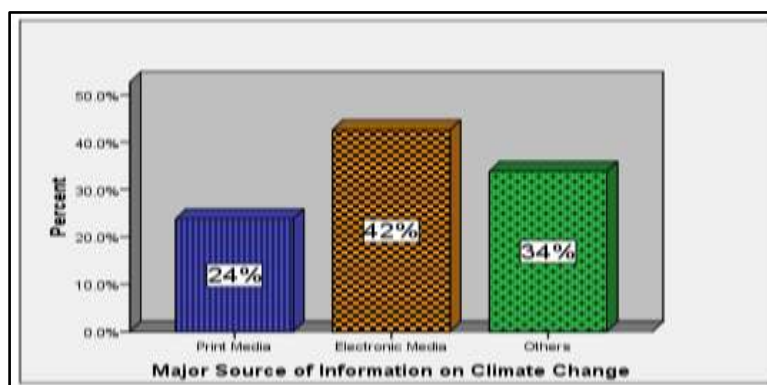


Figure 3: A bar chart showing the major sources of information on climate change

In this study, student’s knowledge about climate change was at a low level. On the scale of 50, the minimum score for the climate change knowledge was -17 and the maximum was 36 with a mean of 13.65. Our results is similar to that of Gichuki (2014) in which majority of students had low level of climate change knowledge. A possible reason for the low climate change knowledge in the current study could probably be the poor integration of climate change topics into the curriculum of pre-tertiary education in Ghana, with no climate change topic in the curricula of the lower primary, Grades 1 to 3, and upper primary, Grades 4 to 6 but a small in the curricula of both Junior High and Senior High Schools (Boakye, 2015).

Similar to the findings of (Essouradjane and Raju, 2014), there was no significant difference in the level of knowledge of student with respect to their gender at $p>0.05$. This was obvious because of the stereotypical relationship between women and science (Spellman et al.,2003). There was also no significant difference in the level of climate change knowledge with respect the age of respondents and their sources of

information about climate change at $p > 0.05$. The non-significant difference in the level of climate change knowledge across the age categories is probably because science is taught at all levels of education in Ghana, except at the pre-school to equip the students to solve environmental problems (Boakye, 2015). However, Gichuki (2014) found a significant association between media with climate change knowledge categories, and Cabecinhas (2006) also found similar results. Morgan and Moran (1995) and Wilson and Henson (1993) also found that students who used print media rather than television as their main source of information were more likely to understand the fundamentals issues on climate change.

In our study, 276(69%) of the respondents have never participated in any climate awareness creation, whereas 124(31%) have at least once been involved in such an exercise using methods such as Posters, Banners, Videos, Petition, Drama, and others like symposium, forum etc. (Table 2 above and Fig 4 below). This low proportion of respondents' involvement in climate change awareness creation is not surprising because of the non existence or inactivity of Environmental Clubs in most of the various schools sampled or the communities where most of the respondents come from. Helferty and Clarke (2009) found that some students groups in Quebec, Canada held Environmental awareness week in 2007/2008, which encompassed climate change awareness raising through similar methods such as posters, petitions, film screening, banners and variety of other initiatives

From our results, there was a weak positive correlation between students' knowledge about climate change and climate change awareness creation, which is significant, $r = 0.101$ at $p < 0.05$, implying that, a significant positive relationship exist between students knowledge about climate change and public awareness creation. Environmental public awareness comes from the result of general knowledge of the Environment, and thus, the role of Students knowledge about climate change in public awareness creation is very important because, there is a need to interpret science in terms of the needs of the general public (Jenkins, 1999)

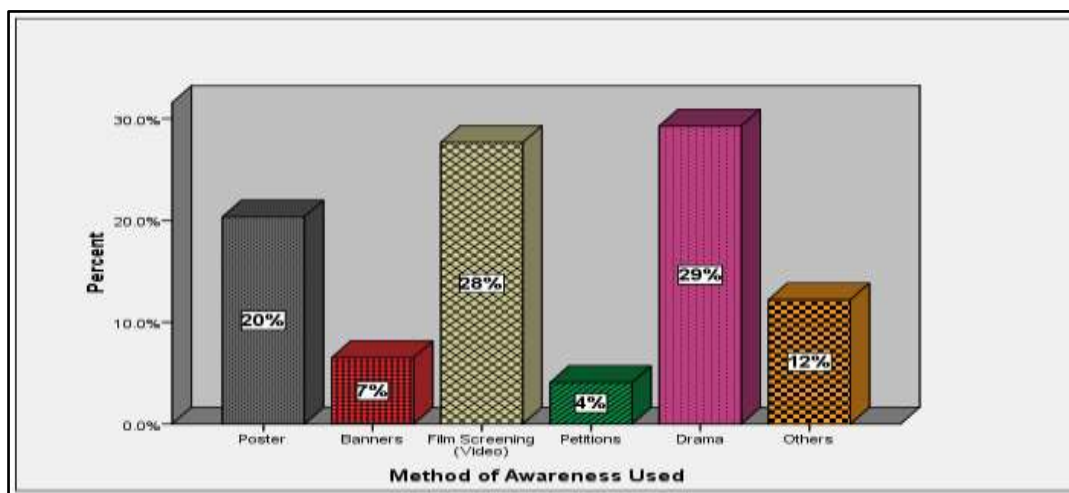


Figure 4: A bar chart showing the methods used for climate change awareness creation.

IV. Conclusions and Recommendation

This study intended to add to earlier studies advocating for proper integration of climate change issues into education curricula of all pre-tertiary levels in Ghana. Adopting both qualitative and quantitative methods of analysis, we investigated the level of knowledge of Senior High Students on climate change and students participation in public climate change education or awareness creation. As has already been established in the existing literature (Boakye 2015 and Choi et al., 2010), and also confirmed in this current study, there is inadequate information on climate change incorporated in the curricula materials particularly textbooks. Consequently, most (68%) of the respondents interviewed pointed to the print and the electronic media as their primary sources of information on climate change issues. However, general knowledge about climate change, especially non-action oriented one, does not directly influence individuals to act towards it.

From our study, we concluded that Senior High Students in the Birim Central Municipal of Ghana have a low level of knowledge about climate change, and there is no statistically significant difference in the level of climate change knowledge between male and female students. There is also no significant difference in the level of climate change knowledge with respect to the age of respondents and their sources of information about climate change. Senior High Students participation in climate change awareness creation is low and there is a positive relationship between students' low knowledge about climate change and public awareness creation. There is therefore the need for action-oriented activities such as the formation of more Environmental Clubs in all Senior High Schools in Ghana to initiate climate change awareness creation.

The implications for policy makers and Educationists particularly those who are actively involved in drawing the curricula are enormous. They should take some of these calls seriously to ensure an adequate integration of climate change topics into the school curricula at all pre-tertiary levels. The teaching and learning methods should touch 'the heart as well as the mind' of the students. Framing of climate change concepts then becomes vital in writing the education curricula. The point made by George Lakoff in relation to framing is worth revisiting here:

But in reality, environmental frames are the (typically unconscious) conceptual structures that people have in their brain circuitry to understand environmental issues. To understand "the real crises" one needs the right conceptual structures in one's brain circuitry. Frames are communicated via language and visual imagery. The right language is absolutely necessary for communicating "the real crisis." (2010, 74). More studies will however be required on climate change in relation to its successful incorporation into Ghana's educational curricula particularly the pre-tertiary in order for right framing to be adopted.

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