AN ASSESSMENT OF THE ENVIRONMENTAL LITERACY OF PRE-SERVICE TEACHERS IN COLLEGES OF EDUCATION IN GHANA

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ABSTRACT

Ghana has lost about 93 percent of its forest reserves in 68 years and its rich biodiversity is gradually being depleted due to poaching, habitat loss, pollution of water bodies and deforestation (Buamah, Petrusevski and Schippers, 2008; Tamakloe, 2010; Tom-Dery, Dagben and Cobbina, 2012). The cost of environmental degradation to Ghana's economy is estimated to be within the range of 1-10% of the country's annual GDP ($12 billion GDP) (GNA, 2007; UNEP, 2013).

Environmental science education in the basic school curriculum is aimed at educating Ghanaians on the environment. Tuncer et al. (2009) argue that teachers will produce students who are environmentally literate when they themselves are environmentally knowledgeable, have positive attitudes towards the environment and show concern for environmental problems. This study assesses the environmental literacy of pre-service teachers in colleges of education in Ghana and their preparedness to teach environmental science at the basic school level.

INTRODUCTION

There has been a tremendous change in the nature of education in Ghana evolving from Traditional African Education [TAE] to the introduction of Western education now termed formal education. The basic principles that underlined most of the indigenous knowledge systems of the Ghanaian people before the introduction of formal education, generally emphasized a common humanity, group belongingness and a harmonious existence between people and the natural world. It involved diverse ways of knowing about the world and the interrelationship between nature, culture and the environment. TAE thus stressed a strong relationship with the environment, and in the past, taboos, religious and cultural practices relating to land, forest and water bodies, formed part of the culture and education which helped indigenous Ghanaians to sustainably manage their environment.

Fast forward to present day Ghana and one quickly notices that, the combined forces of notably Western education, Christian religion and Islam, has unleashed an unprecedented assault on traditional education consequently resulting in the degradation of the country's environment.

Over the past forty years the environment has changed so much that both flora and fauna and indeed the ecosystem, have been adversely affected. Formerly, taboos, religious and traditional cultural practices were enough to control people's attitudes towards the environment but not anymore. For instance, there are days of rest known as 'taboo-days' during which the land and water bodies are expected to rest and farming and fishing are forbidden on such days (Osei, 2006). Boateng and Nana (1990), record that farmers are enjoined to leave a strip of land of about 30 metres which should not be cleared at both sides of streams and rivers. Taboos on eating of totem animals such as alligators, hedgehogs, tortoise, whales, parrots, eagles and

some species of fish ensured the non- extinction of such species (Osei, 2006). Western style education condemned these practices without carefully studying their epistemological basis as it pertained to the different ethnic groups and what they sought to achieve (Busia, 1954; Sarpong, 1974; Boateng, 1983; Mazrui, 1988; Mbiti, 1991; Adeyemi and Adeyinka, 2003).

Current environmental issues in Ghana

Many authors (Songsore and McGranahan 1993; Nsiah-Gyaboah, 1994; Hans and Boon, 1999; Tamakloe, 2008; Buamah, Petrusevski and Schippers, 2008; Tom-Dery, Dagben and Cobbina, 2012) have identified poaching, loss of biodiversity, illegal logging, destruction of natural habitats, illegal small scale and large scale mining, lack of forest governance, human settlements, water quality, industrial pollution and waste management as some of the key problems affecting environmental quality in Ghana. These have resulted in a number of environmental issues.

Currently, there is a decline in carbon dioxide (CO_2) sinks in forested and reforested land and any further depletion it is feared will offset the balance and cause the level of CO_2 to soar. Pollution of water bodies have led to the contamination of fresh vegetables produced in intensive urban and peri - urban smallholder agriculture within formal wastewater irrigation (Amoah, Drechsel, Abaidoo and Ntow, 2006). Rivers draining urban settlements are particularly polluted by both domestic and industrial waste. The Volta River for example, receives discharges from two textile plants, from agricultural activity and from the settlements along the river (Hans and Boon, 1999).

Rapid expansion in urban and suburban areas, poor domestic environmental management coupled with industrial pollution, has led to a decline in sanitary conditions leading to the continues existence and spread of some air and water borne diseases (Songsore and McGranahan 1993; Attipoe,1996). The current transitional state of waste management policy (especially dealing with collection and treatment of waste) has led to use of excavated pits, low- lying grounds, burning and moderately controlled tipping as ways of disposing waste. These practices induce environmental hazards such as dust dispersion, smoke, odour, plagues of insects and rodents (Boadi and Markku, 2005; Oteng-ababio, 2010). High concentration of human activities along the coast puts a lot of pressure on coastal zones as marine fishing serves as a source of livelihood for the majority of the people living along the coast. Agricultural land availability has reduced from 1.56ha in 1970 to 1.11ha in 1984 to 0.74ha in 2000 (Tamakloe, 2010). An economy wide, multimarket model constructed for Ghana projected that land degradation will reduce agricultural income in Ghana by a total of US$4.2 billion over the period 2006–2015, which is approximately 5% of total agricultural GDP (Diao and Sarpong, 2007). The need for agriculturally viable land is important in a country where agriculture contributes 54% of Ghana's GDP and accounts for over 40% of export earnings while at the same time providing over 90% of the country's food needs (SRID, 2001). There are other emerging global environmental issues such as climate change as well as local issues such as the recent discovery of oil and gas and its environmental implications.

STATEMENT OF PROBLEM

The world as a whole is faced with various problems and challenges in addressing environmental issues but when it comes to developing countries such as Ghana, addressing issues of environmental concern is further compounded by a multiplicity of challenges deeply rooted in low levels of poverty, environmental degradation, economic instability and marginalization, issues of politics, policies and governance among others. These challenges notwithstanding, significant legislative and institutional reforms have taken place since 1990s including the establishment of institutions for regulating the environment such as Environmental Protection Agency (EPA), Water Resources Commission, and Forestry Commission. These are supplemented by the activities of non-governmental organizations (NGOs) such as 'Green Ghana', 'The Nature and Development Foundation (NDF) among others. Although sustainability appears in almost every environmental and political discourse, the problems enumerated earlier, persist.

Education for Sustainable Development (ESD) has been proposed by the United Nations (Zakri, 2006). In 1944, noted conservationist Aldo Leopold wrote: "Acts of conservation without the requisite desires and skill are futile. To create these desires and skills, and the community motive, is the task of education" (Coyle 2005, p ii).

With taboos, religious and cultural practices being gradually ebbed away, the biggest window of hope and opportunity that remains open to Ghana to push forward the agenda of environmental awareness and to develop environmental concern and behaiviour in individuals from a young age is formal education. If our educational systems fail to provide knowledge and skills needed for individuals to make intelligent and informed choices about the environment, it will lead to continual environmental degradation. When people are well aware of environmental issues and are well equipped with ways of dealing with these issues, then an avenue has been created to help address these problems confronting the environment. 'The more people with even elementary environmental literacy, the better will be the quality of environment' (Roth 1992, p.35). It is an advantage in Ghana to use the mechanism of formal education to achieve environmental literacy because formal education in the near future will touch almost every Ghanaian. Currently, basic school enrolment is almost 123% (World Bank, 2015). Environmental education is aimed at producing citizenry who are environmentally literate and capable of actively addressing environmental challenges and problems (UNESCO, 1980; Roth, 1992; Coyle, 2005). To do this, teachers play a vital role, they must have the requisite knowledge that will induce concern for and inform their attitudes towards the environment. They must also possess the ability to translate this to groom young learners to become environmentally friendly.

The purpose of this study is to assess the environmental literacy of pre-service teachers in Ghana and their preparedness to teach environmental education at the basic level. To do this, the study intends to answer the following research questions:

1. What is the level of environmental literacy of pre-service teachers in Ghana?
2. What is the relationship between their environmental knowledge attitude and behaviour?

3. How prepared are pre-service teachers to teach environmental education at the basic level?

LITERATURE REVIEW

The current policy directives for the 3-year Diploma in Basic Education are mainly geared towards the training of a generalist teacher who would be able to teach at the basic level. In addition to courses in Education, Practical Activities and General Studies, students will be expected to take at least seven foundation subjects (English, Mathematics, Ghanaian Language and Culture, Integrated Science, Environmental and Social Studies, Pre-Vocational Skills and Religious and Moral Studies). However, specialist training in Mathematics, Science and Technical Skills are offered by specific colleges of Education for trainees being prepared for the Junior High School level. French and Early childhood are also options offered by Specific Colleges of Education. Students taking these subjects are exempted from some of the foundation subjects. A student must have a pass in all required subjects with a GPA of not less than 1.5, successfully complete the one year off campus teaching program and complete a project work for the award of a Diploma. Environmental education as can be inferred from the above is a subject by infusion of environmental topics into related subjects and disciplines (such as Biology, Integrated Science, Environmental and Social Studies and also Environmental and Nature Study activities).

Teachers are most influential in educating children and so, aspiring teachers should demonstrate pro-environmental behaviour and attitudes if they are to integrate environmental education effectively in their teaching upon graduation. However, previous studies show that teachers lack sufficient environmental knowledge in environmental issues which is thought to affect their environmental behaiviour negatively (Florah, 2005; Michail, Stamou, & Stamou, 2007; Spiropoulou, Antonakaki, Kontaxaki, & Bouras, 2007; Esa, 2010). Research carried out by Desjean-Perrotta, Moseley, & Cantu, 2008 and Amirshokoohi, 2010 in the United States revealed elementary pre-service teachers did not hold knowledge sufficient to be environmentally literate. A similar conclusion was drawn by Spiropoulou, Antonakaki, Kontaxaki, & Bouras (2007) in a study involving pre-service primary teachers in Greece even though the teachers were interested in protecting the environment. In Israel, a similar study conducted among first year pre-service teachers indicated limited environmental knowledge and low responsible environmental behaviour although they also had positive attitudes towards the environment (Pe'er, Goldman, & Yavetz, 2007).

An assessment of environmental knowledge and attitudes of some Nigerian school teachers however found a high level of awareness or knowledge on local environmental problems but low level on global environmental issues (Ogunyemi and Ifegbesan, 2011). A recent study by Shiang-Yao et al (2015) which investigated teachers' environmental literacy in Taiwan, revealed that environmental awareness and attitudes among teachers was high but that their level of environmental knowledge was moderate. Similar results are shared in studies carried out by Tuncer et al., (2008) in turkey and Aini, et al. (2009), among Malaysian teachers. Results of these studies also indicate that the practices of environmentally responsible behaviour were not consistent with the level of concern and knowledge. Having

positive attitudes towards the environment for example, might not necessarily culminate into exhibiting corresponding actions to protect the environment. Subsequently sufficient literacy (knowledge, attitude and behaviour) if gained in this field by pre-service teachers does not also guarantee the preparedness of teachers to teach this subject upon completion as there may be barriers to the transition from attitude to action, habits, and teaching practices (Ernst, 2009). Assessing environmental literacy of pre- service teachers can thus provide valuable information for not only indicating the status of environmental literacy in schools but also gauging the potency of how much needs to go into the teaching of pre-service teachers to better equip them to handle topics in environmental education with ease. It also gives an overview of how effective the curriculum structure of subjects infused with environmental education is in producing environmentally literate teachers. The Ghana Education Service views preparation of teachers as one of the essential factors of educational development and identifying and dealing with barriers that impede the smooth transfer of environmental knowledge, attitude and skills by teachers to the younger generation will better prepare these teachers to be confident in their preparedness to teach upon completion. From the foregone, it is safe to draw the conclusion that an environmental crisis is a crises of environmental education, thus the provision of quality education that includes environmental knowledge, attitudes, behaviour is needed to maintain the quality of the environment.

METHODOLOGY

This study is a cross sectional survey and uses a mixed method approach (Quantitative and qualitative). It employs the use of a questionnaire and focus group discussion in assessing environmental literacy of pre- service teachers' in colleges of education in Ghana and their preparedness to effectively and efficiently teach environmental science at the basic level.

The instrument (Assessment of Environmental Literacy) for collecting quantitative data is made up of 15 items each on environmental knowledge, attitudes and concern adapted from studies on environmental literacy (Worsley and Skrzypiec, 1998; Coyle, 2005; Kaplowitz and Levine, 2005).

The focus group discussion (FGD) will concentrate basically on teacher's preparedness to teach environmental science at the basic level. It will be based on discussions on environmental science topics taught at the basic level and would span from knowledge on these topics to various ways in which these topics can be taught effectively. Barriers to effective teaching of environmental science will also be discussed. The focus group discussion will be done in only one college in the sampled zone since all the colleges share similar characteristics in terms of the topic under research.

The colleges of education have been put into five administrative zones. The sample will consist of colleges of education in one zone which will be randomly selected. The sample size for the quantitative part will consist of all final year students estimated at 1500.This is because they are the set of students that would have completed the taught course on all the subjects that infuse environmental education topics. For the FGD, 7 final year pre-service teachers will be randomly selected in one randomly selected college to constitute the group. Analysis of quantitative data will be done

using the Statistical Package for the Social Science (SPSS). Focus group discussions will be transcribed and analysed with the assistance of INVIVO.

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Biography

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