

Learning for Sustainable Development: Integrating Environmental Education in the Curriculum of Ordinary Secondary Schools in Tanzania

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Abstract

The study assesses the extent to which curriculum of secondary schools in Tanzania addresses sustainable education through integration of environmental education. Specifically, it evaluates the subjects used to deliver environmental education in secondary school. Also the study found out perceptions, challenges, and recommendations for implementing environmental education. This research adopted a case study, qualitative approach to study the subject matter in its natural settings while making sense of the contents of the subjects and perceptions of stakeholders. Cross sectional, stratified sampling involved both students from all classes, experienced teachers in geography and biology and a head teacher as well. It was found that most environmental education competencies are delivered mainly through the geography subject, and some in biology using an integrated teaching approach. Students and teachers were fairly knowledgeable and had understanding of basic environmental issues. Main challenges facing implementation of environmental education included an integrated learning approach, inadequate knowledge on environmental education, lack of support from each other and from school administration, and cultural myths and beliefs.

Keywords: *Learning, sustainable development, environment, education, Tanzania*

Introduction

The concept of sustainable development covers a wide range of issues and subjects. In 1987 the United Nations through the Brundtland Commission linked economic development and environmental stability (UNESCO, 2012). According to Emas (2015), the commission defined sustainable development as one that meets the needs of the present without compromising the ability of future generations to meet their own needs. That is, sustainable development focuses on human needs and life supporting systems which includes earth, ecosystems, natural resources, culture and community. Sustainable Development became an issue of major concern in 2012, when the United Nations Conference on Sustainable Development negotiated an international agreement to come up with a new set of global Sustainable Development Goals (SDGs) to guide the path of sustainable development in the world after 2015.

According to UNESCO (2012), the sustainable development goals were intended to go beyond the millennium development goals which expired in 2015. They were focused to provide a comprehensive vision for the evolution of all countries in the years ahead. SDGs were universal, addressing significant challenges to developed countries in transforming their own societies and economies in a more sustainable direction, as well as contributing strongly to the global effort to speed the achievement of sustainable development in the developing countries. Of all 17 SDGs, goals number 11 to 15 addressed major environmental issues such as ensuring safe, resilient, and sustainable human settlement, consumption and production patterns, combating climate change and impacts, sustainable conservation of marine resources, and restoring and promoting sustainable use of terrestrial ecosystems (Ssozi,2012, Walker 2013, Wheeler, 2000).

One of the main aspects to achieving sustainable development is through education. Education for sustainable development constitutes an important part in ensuring that human beings acquire knowledge, skills, attitudes, and values necessary to shape a sustainable future. According to Kimaryo (2011), education for sustainable development envisions a better world where there is a balance between economy, ecology and society. In practice, Ssozi (2012) pointed out that education for sustainable development should address holistically other academic disciplines apart from ecosystem and life science. The author suggests inclusion of societal development, economic growth and environmental conservation. This is important as economic growth has been achieved through unfair deals without taking into consideration environmental consequences and the communities whose survival depends on the environment and the resources therein.

Therefore it can be said that the essence of introducing education for sustainable development is to dissolve the artificial boundaries between the environment, economy, and society. The education for sustainable development concept is well described in the sustainability model as shown in figure 1 below.

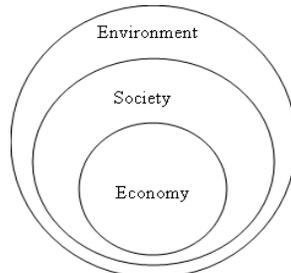


Figure 1: Sustainability model - Modified from Sterling (2005)

As reflected in the latest nested sustainability model above, society is owned entirely by the environment which provides services such as food, clean water, fresh air, fertile soil, and other natural resources. Therefore, sustainability is grounded in ecosystems, society and economy. Social aspects such as culture, beliefs, norms and attitude are at one hand, but also the model addresses issues related to economy such as income, living costs and prices of sources of energy, all in relation to ecological dimensions: life supporting systems such as natural vegetation, water resources, soil conservation, and issues such as climate change and biodiversity conservation.

Environmental Education

Environmental education constitutes a core component of education for sustainable development. Kansas (2012) defined environmental education as a process directed at creating awareness and understanding about environmental issues that leads to responsible individual and group actions. Furthermore, the author describes that successful environmental education focuses on processes that promote critical thinking, problem solving, and effective decision-making skills. Tanzania Environment Management Council (NEMC) considers environmental education as a lifelong process whereby individuals and the whole Tanzanian society acquires knowledge, develops ethics, and becomes environmentally aware/conscious, with relevant skills in identifying, managing, monitoring, evaluating and solving environmental issues and problems (URT, 2009).

On the other hand, the International Union for Conservation of Nature (2010) defines environmental education as the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among humans, their culture, and their biophysical surroundings. In its report, the union insisted that the need of the hour is environmental education and awareness for all so that humans learn how to handle environmental issues, how to lead a better life with less pollution, and to make this earth a better place to live in for the present and future generations. Environmental education utilizes scientific tools; these techniques involve observation, measurements, and classifying, experimenting, and other data gathering techniques. This process assists students in discussing, inferring, predicting, understanding and interpreting data about environmental issues.

The above definitions imply that environmental studies has reached the status of a multidisciplinary subject where it acts as a meeting ground of all disciplines including arts, science, commerce, medical science and engineering. It also covers all fields of environmental science. This includes how humanity can save itself from the problems which we have caused through the abuse, misuse and over-use of the resources provided by the nature. Therefore, environmental education should not only focus on the effects of environmental degradation but very importantly, the understanding of the fundamental causes.

Environmental Education in Secondary schools in Tanzania

Like other countries in the world, Tanzania has responded through international conferences, forums, global conventions, and international declarations concerning the environment. In 1990s the country, through the ministry of education, formulated environmental education courses and incorporated them officially in secondary school curriculum at all levels as integrated subjects, not stand alone subjects. Also government

concerns about environmental management and conservation were added, and now clarified, in the objectives of education in Tanzania. The Tanzania Education and Training Policy (URT, 2005) shows the emphasis on environmental education; one of its major objectives is, “to enable a rational use, management and conservation of the environment” (URT, 2005). This however is a theoretical and hypothetical effort in rolling out environmental education in secondary schools in Tanzania.

Integration of teaching and learning approach

The Tanzania secondary education system has adopted an integrated teaching approach to address environmental education. That is, environmental education competencies are integrated into other subjects. Kadji (2002) wrote that an integrative approach in teaching is based on both philosophy and practicality. It is generally an approach which purposefully draws together knowledge, skills, attitudes, and values from within or across subject areas to develop a more powerful understanding and linkages of key ideas. The integrative approach is not only in Tanzania, various writers have reported the use of this teaching strategy in different countries. Uganda, Nigeria, New Zealand, China and Jamaica have been reported to use integrated teaching and learning in their education systems (Ferguson, 2008 and Stapp, 1997).

Baxte and Jack, (2008) highlighted advantages of using an integrative teaching approach, which includes allowing teachers to plan for the development of key skills and understandings that transcend individual strands and subjects, while helping students to build on their diverse prior knowledge and experience, support their holistic view of the world, and ensure more meaningful learning. The brain research by Dylan (1998) supports the theory that younger students take in many things and process and organize them at one time. That means teaching ideas holistically, rather than in fragmented pieces, better reflects how young students’ brains process information. Also Drake (2004) considered an integrated teaching approach to be the path that makes sense in education in this century as it connects what is learnt to real life situations. A problem-based education model is a good example of an integrated teaching approach that offers high potential for the identification of relevant, highly motivating problems.

On the other side of the coin, integration of environmental education into different subjects creates a number of limitations and challenges to education systems (Johnson, 2005 and Palmer, 1998). It is argued that when environmental education is integrated into the content of other subjects, learners fail to develop a clear understanding of what different disciplines or forms of knowledge contribute to the understanding of an environmental topic (Kadji, 2002). In addition, teachers find it difficult to link environmental education content with subject content because there seems to be no clear formula for implementation. As a result, many teachers are not comfortable with teaching through integration (Drake, 2004). It is also thought that the integration of environmental education into existing subjects may not be accorded adequate weight in all subjects.

The current study assesses the extent to which curriculum of secondary schools in Tanzania addresses sustainable education through integration of environmental education. The study specifically evaluates the contents (subjects) incorporating environmental education in secondary

school, and the method of delivery. Also the study explores perceptions of both teachers and students on the integration of environmental education in the curriculum. Hart (2003) asserts that teaching and learning are strongly influenced by the individual's perception and action. Therefore, if environmental education is to be implemented by secondary school teachers, through mainstreaming it into the content of the subjects they teach, there is need to seek their perceptions and understanding of teaching environmental education as an integrated component. The focus of this study is to illuminate the relationship between secondary education in public secondary schools in Tanzania and environmental education.

Methods and Tools

The study adopted a qualitative case study design in order to describe and understand phenomena from participants' points of view. (Leedy, 1997) defined qualitative study as an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants' perceptions. This means, being a qualitative researcher in this study, environmental education has been explored in its natural settings. This research used a case study approach in order to analyze in detail how environmental education is integrated in public secondary education in Tanzania. Cohen and colleagues (2011) defined a case study as a single instance of a bounded system which is designed to illustrate a more general principle.

This is a case study of Mtibwa community secondary school, a publicly-owned school, established in 2004, in the semi-urban Mtibwa ward, Mvomero district, in the Morogoro region. Like all other public schools, it is managed by the education department of the district council through a school board and the head of the school, under the ministry of education and vocational studies. According to the head of school, in September 2011, the school had 691 students of which 329 are girls and 362 were boys. Secondary education and thus environmental education, in Tanzania is managed by the Ministry of Education which is in charge of all education operations in primary, secondary schools, colleges and universities in the country.

Respondents comprised of students, teachers, and the head of school; 54 percent were males. Students were selected representing a cross section of all classes from form I to form IV. Students' selection for focus group discussion was based on representation of both males and females. Geography and Biology teachers with more than two years of experience were also chosen to be interviewed through a questionnaire. This selection was important so as to allow opinions from more experienced teachers and benefit from practical classes experience in environmental education. Table 1 below shows characteristics and representation of respondents.

Table 1 Respondents profile and characteristics

Respondents	Category	Male	Female	Total
Students	Form I	6	4	10
	Form II	7	3	10
	Form III	5	5	10
	Form IV	4	6	10
Teachers	Geography	1	3	4
	Biology	2	1	3
Head teacher		1		1
Total		26(54%)	22(46%)	48

In Tanzania education system, the ministry of education manages and decides the curriculum and syllabus content which is followed by all secondary schools in the country. However the results for this case study cannot be generalized to all secondary schools in Tanzania as variation between schools exists. There are differences between urban schools and rural schools, old and new schools, private schools and public schools, well led schools and poorly led schools. Depending on this situation there might be similar cases to this study, however. Respondents in the study area were stratified selected to represent entire school population including students from each class, biology and geography teachers, and the head of school. Data collection tools used were documentary review and focus group discussions with students, teachers and administrators.

Results

Subjects used to deliver environmental education

Data sources from the study area, documentary review and survey of the ordinary level secondary school syllabus indicated that environmental education issues and concepts are addressed in biology and geography subjects. Table 2 below indicates subjects that are taught in ordinary secondary schools and relevant topics that address environmental education and their respective objectives.

Table 2. Environmental education contents in secondary schools

Subject	Class	Topic	Objectives
1. Biology	Form I	Safety in our environment	i. General concepts including, safety in home/schools, first aid, waste disposal, ii. Health, immunity and HIV/AIDS.
	Form II	Balance of nature	i. Concepts of natural environment, ii. Interactions of organisms, food chain and food web.
2. Geography	Form I	Climate	i. Concept of climate and its relationship to human activities
	Form II	Water management for economic development	i. Relationship between vegetation and water supply ii. Benefits of developing river basin. iii. Land reclamation and sustainable use of water resources. iv. Water pollution and conservation
		Sustainable use of forests	i. Types, distribution and importance of forestry resources in ecological and environmental balance. ii. Ways to address problems facing forests in the world

	Sustainable mining	i. The effects of mining on the environment and ways to minimize them
	Manufacturing Industry	i. Types of pollutants from manufacturing industry
Form III	External forces that affects the earth mass wasting Weathering, erosion and deposition	i. Effects of external forces on the environment.
	Soil	i. Concept of soil formation, erosion control and conservation.
Form IV	Climate and natural regions	i. To explain the relationship between human activities and climate.
	Environmental issues and management	i. Importance of environment ii. Environmental problems
	Environmental conservation	i. Cause, extent and effects of the loss of biodiversity. ii. Pollution and waste management. iii. Cause, extent, and impacts of fast rate of population growth, urban growth, and diversification. iv. Impact of poverty on environment. v. Environmental conservation and management at

Source: Secondary school syllabus (2005), Tanzania Institute of Education.

Hypothetically the contents look adequate and address mostly important and contemporary environmental issues such as interactions of organisms, concept of climate, water management, forest resources and pollutants from manufacturing industry, erosion, environmental issues and environmental conservations. Furthermore for each learning item, there are set of objectives to help guide a trainer to achieve targets of the course.

Findings indicated that the geography subject carries more content of environmental issues as compared to biology and other subjects such as chemistry. In form III and form IV, biology was not found to have any environmental education topics and issues. This study contends that this type of distribution and integration of environmental education in the curriculum raises misconceptions amongst students as most of them think that environmental issues are more related to geography and geography students, hence reducing its crosscutting nature to other fields, and at the same time overcrowding the subject content. The result is hampered efficiency, morale, interest, and motivation for teaching and learning with both teachers and students.

Students' Understanding of Environmental Education

During focus group discussion, students were probed to give their understanding of the environment, environmental education, and various basic environmental issues. Of all 40 students interviewed during focus group discussion, about 31 students understood the meaning of environment as surroundings around human beings, natural and artificial resources and the world in which people, animals and plants live. This is a response from a form I student about the meaning of the environment;

“Environment includes all natural and artificial resources that surround human being”

Another form II student responded that,

“Environment simply means the world in which people, animals, plants and their surroundings; while environmental education is the study which deals with man and his surroundings, the knowledge of things that surrounds a human being.”

While the other student from a form IV class, when asked what is environment and environmental education, said that,

“Environment is the term which is used to describe all things that surrounds us and environmental education is the skills and knowledge about the environment for example how to conserve the environment.”

The study found that 78 percent of all students were able to describe the meaning of environment and environmental education. This result indicates that students have an idea of the two terminologies. However, from these responses teachers and students need to work more to grasp a real and factual meaning of environment and environmental education. As defined earlier in this report, a definition of environment should consider as well the conditions and influences that affect the development and life of all organisms on earth, as stated by Stapp (1997).

The study also assessed students’ understanding of various environmental issues they have been learning and how environmental aspects have been affecting their lives. As indicated in the diagram above, 18 students were able to mention various environmental issues they have been learning in their classes such as conservation methods, forestry and afforestation. Also 15 students were able to link and conceptualize environmental issues learned in the classroom and in real life.

A form II class student responded that;

“Yes, environmental issues affect my life, some people has no enough knowledge about their environment. Through cutting down trees (deforestation) so as to get timber and wood, which causes lack of rainfall and thus leads to drought and desert because forest helps in formation of rain.”

There was another interesting response from a form III class student who thought that environmental issues never affect his life; he said that,

“Environmental issues do not affect my life, because as we know if you make environment clean and avoid dirty things you cannot get any effects or diseases such as malaria and cholera”

However, students had difficulties in conceptualizing specific areas outside the classroom where they should apply their environmental education. When asked the question *“What are specific areas do you apply environmental education outside the classroom”* during focus group discussion, no one volunteered to respond, after a thorough probing, four students managed to mention tree planting and agricultural activities as an area where they can apply the environmental knowledge they are learning. This signifies that either teachers have not done enough with environmental education at the school or there is a problem somewhere with the integration of environmental education in the school curriculum.

Teachers understanding of environmental education

Teachers' experience and perception of environmental education is another aspect in ensuring effective delivery of environmental education. When emphasizing the importance of teachers in the effective implementation of environmental education, it is suggested that teachers have to be committed and also need a good knowledge base in environmental education. A good teacher should also possess means for representing and communicating the knowledge and skills to the learners. Thornton (2001) said that teachers must not only know the subject matter that they teach, but also the appropriate methods to transform it for the purpose of instruction. Shulman (1987) referred to the knowledge that the teacher needs to have as pedagogical content knowledge (PCK).

During this case study, the teachers' evaluation on whether they had specific training on environmental education was conducted through interviews. The results indicated that out of eight teachers interviewed, only two admitted to having received specific training on the subject matter, while other three said they had not been trained in environmental education. They highlighted large class size, lack of teaching and learning materials, and lack of environmental knowledge on their part as the main barriers for effective teaching and learning environmental education in the school.

Table 3: Teachers' perceptions of environmental education

Response	Yes	No
Received training on EE	2	6
Getting support from Supervisor	3	5
Are you happy with EE content	3	5
What should be added		
Practical topics	7	1
Environmental Sustainability	5	3
Culture and beliefs	6	2

Findings in the table above indicate differences in perceptions that exist among teachers themselves, five teachers interviewed felt that they were not happy and comfortable with the contents and topics of environmental education they were teaching. They thought that the contents were inadequate and irrelevant to the needs of students and community in which they were living. One geography teacher reported that,

"I am NOT happy with the contents of environmental education, because environmental education contents do not cover all aspects of environment in its totality, and as a result we see our students do not get and come out with practical and doable solution to environmental problems."

On the other hand, teachers gave ideas and opinions, and insisted on several areas that they thought important to be included; these included practical/hands on activities, sustainable utilization of natural resources, and culture and beliefs contexts in environmental management. These findings are similar with those reported by Kimaryo (2011) who had the opinion that environmental education in Tanzania lacked practical and applied skills that connected with classroom knowledge.

Discussion

This study examined existing challenges in implementing environmental education in the study area. It is at this basic level where environmental education is implemented. Therefore ideas, opinions, and perceptions are the basic foundation to evaluate success of the integration of environmental education in the curriculum of secondary schools.

This study found various challenges to implementation of sustainable environmental education in schools in Tanzania. Inadequate knowledge of environmental education was the common challenge that was mentioned by 71 percent of all respondents. Most teachers admitted that they did not feel they have adequate knowledge and understanding of contemporary and dynamic environmental issues; as a result they lost confidence and sometimes skipped topics related to environment. For example, one geography teacher pointed out that;

“I feel like I am not confident to teach some emerging environmental related concepts such as climate change, global warming, sustainable utilization of natural resources. This is because these are emerging issues and we were not trained in our colleges.

Another challenge mentioned mostly was lack of support from each other and from school administration. Teachers expected to learn from each other and also they expected the school administration to support them in on job training to update their knowledge on various subjects. Teachers reported that there is a lack of collegial and administrative support among teachers in the study area as far as the teaching of environmental education is concerned. When asked of teachers training, experience, and implementation of environmental education at his school, the head of the school had replied that,

“I have been trained to teach history and English, frankly I have not been trained to teach environmental education and I have no any experience on that. We have shortage of teachers with relevant competencies, few we have are overloaded and not motivated at all. Frankly speaking, I don't see significant behavioral change in knowledge of the environmental education, except little knowledge which mostly is for passing final national exams.”

When asked if the school is getting support in implementing environmental education from a higher authority, what topics he thought were missing and should be added to improve environmental education, and what were challenges to implementing environmental education, the headmaster pointed out that,

“I don't get any support from higher authority, except they are always insisting verbally that we do much environmental education, however without any support in terms of planning, guidance, materials, funds etc”

“I would like to see environmental education teaching and techniques are improved, and more practical session included.”

Other challenges mentioned were the integrated teaching and learning approach where it was reported that this approach reduced concentration and seriousness of the subject matter. Cultural myth and beliefs about natural phenomena such as heavy rainfall, earthquakes, drought, and forest fires that are caused by gods who are angry, was reported to be another barrier to effective environmental education.

The results from this study were similar to findings from an earlier study done in the USA on middle school teachers, where the barriers which teachers face in teaching environmental education were lack of administrative support and funding (Ernst, 2009). Since environmental education seems to be something to be integrated into the existing subjects, teachers might need the consent of the head teacher to teach it. For example, in a study done in England and Wales, one of the teachers explained that if teachers want to teach a topic on sustainable education, they have to convince the head teacher of its benefits with regard to the other topics in the curriculum (Summers et al., 2003). Thus, it is evident that implementation of environmental education in other study areas is not done effectively.

Conclusion and recommendations

It has been found that implementation of sustainable education through environmental education is fairly inadequate. Environmental education has been integrated in ordinary secondary school curriculum mainly in geography and biology subjects. These subjects deliver important components of environmental issues such as interactions of organisms, concept of climate, water management, forest resources, pollutants from manufacturing industry, erosion, environmental issues, and environmental conservation. These are important competencies in building a sustainable future of the world. The curriculum could adequately address sustainable development if social aspects such as culture, beliefs, norms, and attitudes could be linked with economic and ecosystem contexts.

The results of this study represent similar situations in other public secondary schools in Tanzania simply because they use similar and centralized curricula and syllabi. However disparities may exist from one school to another due to differences in population, availability of basic needs, infrastructures, numbers, experience and skills of available teachers, urban and rural schools etc. Therefore it is recommended that this type of research could also be extended other schools, stakeholders such as teacher educators, primary schools pupils, and higher education authorities so as to increase the sample, obtain their ideas, attitudes, practices, and experiences about this subject matter. Another area of research could be teachers' knowledge base, which is very important in teaching. The findings of this study revealed that some teachers do not feel competent in teaching environmental education because they lack the knowledge base. Research on teachers' environmental literacy level could be a good basis for planning both pre-service and in-service courses for teachers.

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Thumb nail photo.

