

# The role and use of scientific and cultural ways of thinking in education for sustainability (EFS) to promote sustainable use of resources

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Accepted 31<sup>st</sup> January, 2013

**Abstract.** The concept of Education for Sustainability (EFS) is interdisciplinary and crosscutting because it integrates content and issues across disciplines and curricula. The interdisciplinary approach from EFS is vital because it necessitates breaking down of frontiers between disciplines and makes education focus on a single real world issue of sustainability addressed from various perspectives hence promoting systems and integrative thinking in dealing with issues concerning sustainability. It advocates change of behaviour towards sustainable development and environmental resource management through a holistic, interdisciplinary approach to develop knowledge and skills, change in attitudes and creation of new values and skills towards sustainability. This helps people to better understand the world in which they live, address the complexity and interconnectedness of problems in the world such as environmental degradation, gender inequity and poverty, and a need for collective approach to solve them; consequently, creating a cadre of people with integrative ways of thinking in order to have collective participatory approach towards sustainable use of resources. It is, therefore, against this background of interdisciplinarity in EFS that this article critically analyses the role and use of both scientific and cultural ways of thinking in EFS. It first proposes the working definition of EFS and justifies the integration of scientific and cultural ways of thinking in EFS. It then critically analyses the role and use of scientific and cultural ways of thinking in EFS. It finally concludes by putting together issues captured in the paper and my reflection on the paper.

**Keywords:** Culture, Education for Sustainability, Science, Sustainability.

## INTRODUCTION

This article critically analyses the role and use of scientific and cultural ways of thinking in Education for Sustainability (EFS) to promote sustainable use of resources in Malawi. It first proposes the working definition of EFS and justifies the integration of scientific and cultural ways of thinking in it. It then critically analyses the role and use of scientific and cultural ways of thinking in promoting sustainable use of resources. In this article, I want to advocate that cultural and scientific ways of thinking are inextricably linked and complimentary in sustainability. The knowledge of the intersection of science and culture enriches the concept of EFS because it promotes partnership among various

stakeholders such as scientists, local people, ecologists, sociologists and economists in dealing with sustainability issues. This is the case because the focus of sustainability is participation from all the stakeholders irrespective of their disciplines in the society towards sustainable practices.

Observations and processes of understanding the natural world have provided indisputable evidence that current worldwide trends in human activities and economic development trends are unsustainable (Malunda, 2002). In Malawi, this is evidenced by deforestation, land degradation, and depletion of resources. This scenario necessitates the development of

a locally relevant and culturally appropriate system of education at both formal and informal levels, which would promote awareness, change in attitudes, passing on values and skills for individual and collective change towards sustainable practices. It is in the context highlighted above that sustainability needs to be introduced at both formal and informal education sectors in order to promote sustainable use of resources. Sustainability tends to achieve this by empowering people with knowledge, values and skills for lifelong learning to help them understand the intertwining of economic, social and ecological balance in sustainability (Douglas, 2000). This forms a paradigm of thinking in the pursuit of sustainable development and improved quality of life through integrative ways of thinking across disciplines in order to have a collective approach towards sustainability. It is, therefore, against the interdisciplinary background in sustainability that this article critically analyses why both scientific and cultural ways of thinking are necessary for sustainable use of resources in Malawi.

### **The Concept of Education for Sustainability (EFS)**

The concept of Education for Sustainability (EFS) is infiltrating the daily language and consciousness. It is a normative ethical principle, not a scientific concept as such, and since it has both necessary and desirable characteristics, there is no single model of a sustainable society (Robinson, 2001). The concept has emerged because the current trends of human practices have failed to maintain a balance in sustainable environmental and resource management.

As a complex concept, sustainability resists simple definition. It spills over disciplinary borders, employing metaphors and insights from a number of relatively new scientific disciplines including systems and ecological sciences. It is also a contentious issue and people define it in different ways. For instance, Fien (2001:1) defines EFS as:

“a system of education that encompasses a vision for society that is not only ecologically but also socially, economically and politically sustainable by involving approaches to teaching and learning that integrate goals for conservation, social justice, appropriate development and democracy into a vision and a mission of personal and social change.”

Sterling (1992:56) defines EFS as:

“a process which is relevant to all people and that like sustainable development itself it is a process rather than a fixed goal.”

Parker (2008:53) defines EFS as

“a system of education that is concerned with the study, development and reorientation of education and learning systems, interdisciplinary and connectedness of issues and knowledge production systems to pass on knowledge and values to create skills for collective participation in sustainability and reflexive enquiry.”

Finally, Harrison (2002, p.118) defines EFS as:

“a process of conscious collective evolution and not a matter of a few quick fixes and business as usual or pursuit of a single social value; it is continuous principled vigilance geared towards sustainable use of resources by developing people’s awareness, competence, attitudes, values and skills to enable them to be effectively involved in issues of sustainability at local, national and international levels.”

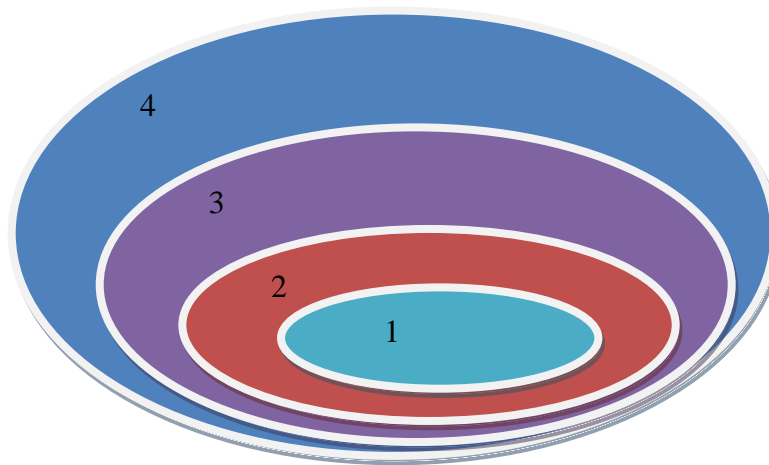
Although these definitions show different perspectives that scholars have towards EFS, all of them are focusing on both an individual and collective action towards sustainability. For instance, Fien (2001:1) uses the word society for collective action; Sterling (1992:56) looks at EFS as a process relevant for all people and Parker (2008:53) states that EFS is about creation of values for collective participation in sustainability. Finally, Harrison considers EFS as process of collective evolution geared towards sustainability. However, though the definitions of EFS are intersecting, this article primarily adopted to use the definition of EFS by Harrison (2002:118). The choice has been driven at because the definition focuses depicts sustainability as a lifelong learning process that leads to an informed and involved citizenry with knowledge and values to create problem-solving skills and a commitment to engage in responsible individualized and cooperative actions to ensure an environmentally sound and economically prosperous future (Clover, 1989). Lifelong learning refers to formal education as well as non formal learning throughout one’s life time, which is seen as a seamless process that occurs in myriad formal, non formal and informal ways during an individual’s lifetime. It also advocates that sustainability is about new ways of doing thinking about an aged-old concern to ensure that the future generations inherit a tomorrow that is at least as good as today because it challenges doing thing as business as usual. In other words, sustainability is about the ability of a living system to sustain its existence in the long term.

Using the lens of the Four Quadrant Model by Wilber (1996) illustrated in Table 1, this context of sustainability helps to create a framework for participation in simultaneous pursuit of economic prosperity, environmental quality and

**Table 1.** The four quadrant model.

	<b>Non-visible inner activities (in the mind: subjective)</b>	<b>Visible, outer expressions (external) (in the world: objective)</b>
Individual dimension	<b>Quadrants 1: Experience</b> Individual experience, thinking and analysis, feelings, emotions, intentions, motivations, which may not be evident to the person's everyday awareness (may be conscious or unconscious)	<b>Quadrant 2: Behavior and Activity</b> Individual behavior and expression of values, analysis, feelings that have visible, tangible effects in the world such as socially, economically and ecologically
Collective dimension	<b>Quadrant 3: Culture</b> Shared frameworks of beliefs, meaning, values, norms, purposes, interests, and judgments, priorities that inform policy, behavior and institutions. This can be political, religious, scientific, ecological...	<b>Quadrant 4: Behaviour and Activity (in society, economy, ecological, institutions, groups)</b> Group expressions with tangible effects on others (e.g socially, economically and ecologically). Formal policies, structures and institutions.

Adapted from Figure 5.1, Wilber, 1996, p.71.



**Figure 1.** EFS Model (Maiteny, 2002). Key: 1 represents EFS, 2 represents education as a whole, 3 represents politics, society, economics, culture and science and 4 represents biophysical systems.

social equity to achieve sustainable resource management for individual and collective participation in sustainability. The Four Quadrant Model is a framework that helps to think through and clarify the significant dimensions of any situation and in identifying different types of activities and their impact- cultural, behavioural, experiential, social and ecological (Maiteny and Parker, 2002). The model has four quadrants that describe both the individual and collective dimensions of behaviours towards sustainability (Table 1).

The model emphasizes that all the quadrants are interrelated and mutually dependent and together they form a whole. It is through this model that EFS emphasizes passing of knowledge and values to create a citizenry with skills and change in attitudes for active participation towards sustainable practice in the society. It is for this reason that Harrison advocates that EFS is not about business as usual but it is concerned with some new initiatives to bring about change in attitudes towards

the current practices and promote sustainable ways of doing things.

### Operational model for EFS

The operation of EFS uses as systems model which views the programme contents as a series of nesting and dynamically related systems as shown in Figure 1.

In Figure 1, nest 1 shows that at the centre of the framework is EFS. While nest 2 shows that the context of EFS is education as a whole. That is to say EFs can be offered through all forms of education. Furthermore, nest 3 shows that the contexts of 1 and 2 are the political, social, economic, scientific and cultural environment. Nest 4 shows that contexts of 1, 2 and 3 are the biophysical environment.

That is why this article is looking at the role of scientific and cultural ways in education for sustainability in promoting

**SUSTAINABILITY OF**

Beliefs, values, meanings, purposes, expressions, constructions, representations  
(Cultural, religion, political, cognitive)

**AND**

Human societies, families, institutions, production, consumption  
(Social and economic)

**DEPENDS ON**

Physical life-support systems  
(Biotic, ecological, abiotic)

**Figure 2.** Scientific model of sustainability. Adapted from Figure 5.1, Wilden, 1987, p. 168.

sustainable use of resources based on the relationship among the nests.

### **Justification of integrating science and culture in EFS**

The concept of EFS is interdisciplinary and crosscutting because it integrates content and issues across disciplines and curricula (UNESCO, 1994). It requires an understanding of the interdependence and interconnectedness of humans and the environment. For instance, EFS has knowledge of socio-geopolitical disciplines, some elements of biological and physical science and human socio-economic systems (Douglas, 2000). The interdisciplinary approach is vital in EFS because it necessitates EFS in breaking down of walls between disciplines and focusing on a single real world issue of sustainability addressed from various perspectives hence promoting systems and integrative thinking in dealing with issues concerning sustainability. Systems thinking is “an approach that put emphasis on relations and pattern (including dynamics and flows distortions, feedbacks and causation); encouraging a participative awareness and wisdom in relation to designing sustainable and multilevel physical, environmental, social and economic systems” (Huckle and Sterling, 1996:23). This offers an opportunity to develop and exercise integrated systems approach during the process of learning about sustainability. An example of an environmental sustainability issue in Malawi that would require interdisciplinary approach is an environmental problem of deforestation (Malunda, 2002). This issue traverses studies of natural science, social studies culture and humanities. Hence, solutions to this problem require interdisciplinary approach from these disciplines. It is against the concept of interdisciplinarity that this paper critically analyses why the integration of scientific and cultural ways of thinking is necessary in EFS for sustainable use of resources in Malawi.

### **A critical analysis of the role and use of scientific thinking in efs**

In this article, science is operationally defined as a dynamic process of finding out how things happen and a search for the best answer to questions concerning the world around us (Harnobay, 2000). The definition is in line with sustainability because this would help science to explain and understand the dynamics of what is required to prevent the human system from destroying the environment on which it depends. In order to make fair contributions of how science promotes sustainability, consider the model below that shows the Scientific Model of sustainability.

### **The scientific model of sustainability**

The Scientific Model (Figure 2) emphasizes that the existence of human beings and society depends on the physical life-support systems (Maiteny and Parker, 2003). Thus, the existence of nature is not dependent on humans but humans are dependent on nature. In addition, human sustainability is also increasingly dependent on developing cultural world-views that keep natural/ecological systems in a condition that can continue to support human life because, as the ‘Inevitable Rule’ (Wilden, 1987:86) states: “the system that destroys its environment destroys itself.” The main purpose of science, therefore, from the model in the context of sustainability is to understand and clarify the dynamics of what is required to prevent the human system – individual as well as collective, physical, social, economic, cultural and psychological- from destroying the environment on which it depends. This section, therefore, looks at the role and use of science in EFS in supporting the prudent management of the environment and development for daily survival and future development of humanity. The focus is on science as a source of knowledge in EFS, a

tool for research in EFS and a tool for solving problems related to sustainability.

### **Science as a source of knowledge in EFS**

Science is one of the disciplines that influence the epistemology of EFS as it provides knowledge about preservation of biodiversity. Epistemology in this article is a method or ground for generating knowledge, which looks at whether knowledge can be acquired or constructed (Plant, 2005:41). This knowledge is vital for a number of reasons but this section only focuses on science as a basis of understanding the interconnectedness of ecosystems in EFS, and the basis of EFS in influencing policy formulation in Malawi.

### **Scientific knowledge as a basis of understanding interconnectedness of the ecosystems in EFS**

Science provides information about the interconnectedness of the physical and biological systems on how they depend on each other, keep the earth fit and sustain human life (Sloep and van Dam-Mieras, 1995). As indicated by the Scientific Model of Sustainability (Figure 2) above, EFS addresses the concept of biodiversity by focusing on the interlinking issues of biodiversity and livelihood. This offers EFS an opportunity to develop a better understanding of how consumption impacts biodiversity at local and global levels, to sensitize people of their role and responsibility in the process of sustainable development (Johnstone, 1994). Consequently, EFS would help to develop human resource at different levels through formal, informal, adult, youth and community types of education with understanding of the symbiotic relation in the ecosystem (Hartman, 2001). This would lead into the process of disseminating information about the interconnectedness of the biodiversity throughout the whole society. EFS could do this through multilateral biodiversity conservation project with strategies to support sustainable development and how to prevent habitat and species losses through unsustainable human activities (Lawrence, 2000). This is in line with the definition of EFS that is focusing on empowerment of people with knowledge, values and skills (Dreyfus, 1995) for participation in sustainable communities. Thus EFS would make people aware on how to safeguard the welfare of the biodiversity towards sustainability as outlined in the Scientific Model that the existence of a human beings and society depends on the physical life-support systems (Wilden, 1987).

In addition to the awareness, the scientific knowledge would help EFS to pass on knowledge, values, and skills and facilitate change in attitude towards the ecosystem. This would make people aware of their responsibility to safe guard the ecosystem. This is supported by the

research conducted by Dreyfus (1995) on "Biological knowledge as a prerequisite for the development of values and attitudes necessary for sustainable use of resources." The emphasis of the article was on the relationship between biological knowledge and socio-human values. Dreyfus (1995) concluded his article by emphasizing that values must be knowledge-laden as such science helps to develop sustainable values and as a corollary, of reasonable attitudes for sustainability.

### **Scientific knowledge as a tool to influence policy and decision-making through EFS**

Science driven knowledge is an essential tool in resolutions to environmental problems and decision making for a sustainable future (Robottom, 2007). One of the functions of EFS is to influence policy formulation through informed decisions towards sustainability. The incorporation of scientific thinking in EFS would provide information about ecosystems to better enable EFS influence formulation and selection of environment and development policies. EFS would be a vehicle to pass on the scientific theories related to sustainability to policy and decision makers (Lawrence, 2000) like the Department of Environment and Natural Resource Management (DENRM) in Malawi, which is responsible for environmental policy formulation through consultative and sensitization meetings. Through multidisciplinary, sustainability science ushers new information to the DENRM to help policy and decision makers to better understand how systems work in the ecosystems towards sustainability, which would be a basis for formulating relevant and contextual environmental policies. The policies would be a framework for action on issues concerning sustainability, as in the individual and collective dimensions in the Four-Quadrant Model (Wilber, 1987) in Malawi. Using the policy, we can have a guiding framework with operational guiding lines to help people on how to use resources in a sustainable manner. The policy would also help government to have standards that must be followed for the promotion of sustainability and how it can work with the local people on issues of sustainability.

In addition, science would help EFS to create a data bank of knowledge on climatic change, growth rate in resources consumption, demographic trends and environmental degradation for example, which policy makers would infer to during policy formulation on sustainability (Taylor, 2006). This can be achieved by conducting research on the topics in the previous sentence. Through such research, data can collected to reflect what is happening on the ground. Consequently, helping policy and decision makers to attain an empirical understanding of the world and its relationship has attributed to the awareness of fragility of our current approaches to solving environmental problems (Dunbar,

1996). Therefore, sustainability science would use this perspective as a basis to recommend options for mitigation and adaptation for policy and decision makers to consider in policy formulation of long-term strategies for environment and development in Malawi.

### **Science as a tool for research in EFS**

In this paper, research is operationally defined as a systematic process aimed at discovering new facts and information in order to increase human knowledge (Harnobay, 2000). In sustainability, research is also concerned with assessing the vulnerability of people and the ecosystem to change and assessing their resilience to adaptability. This section critically analyses the importance of research in EFS. In this regard, focus areas are on use of research as a tool to discover new knowledge for EFS and as a tool for solving problems.

### **Discovery of new knowledge**

One of the main functions of research is to generate new knowledge for the society. As reflected in the definition, this aspect is vital in EFS because EFS is a continuous journey whose knowledge has to evolve with time to make it relevant all the time. The current store of knowledge for EFS will not be adequate to meet projected and as-yet-unforeseen challenges to sustainability, hence the need to produce and apply new knowledge (Maiteny, 2002). For example, global environmental challenges present severe problems that require new fundamental understanding as well as tools arising from the understanding. Therefore, scientific research would play a role in generating new knowledge for EFS about behaviour related environmental problems because old habits are very strong barriers to pro-environmental behaviour change (Maiteny, 2002). This could be done through research in ecological processes, human behaviour towards environment and new interdisciplinary fields, which would help EFS limited capacity to predict or lessen the consequences of natural disaster and ecological change with new information in Malawi through human practices.

This is in tandem with Dreyfus (1995) research which also comments that discovery of new knowledge helps to make policy makers and the public as whole to understand new trends in sustainability and develop resilient systems to promote sustainable use of resources in Malawi.

In addition, the discovery of new knowledge by scientific research in EFS is an essential element of a transition to sustainability. For example, scientific research contributes to discovery of new energy sources, more efficient methods of food production, better quality products, improved human health and environmentally

benign technologies (Meyer, 2000). The knowledge would be used to provide tools needed in EFS to gauge how well human current needs are being met and the extent of progress towards sustainability as EFS is about equipping people with problem solving skills for participation in sustainable communities (Clover, 1989). Thus, the scientific community would provide leadership in EFS research in Malawi to help the wider community to make transition to a sustainable future in a way that minimizes threats to the natural environment. It assists EFS to provide new knowledge for improvement in efficiency of resource utilization and finding new practices, resources and alternatives that would promote sustainable development in Malawi.

### **Science as a tool for solving problems related to EFS**

Scientific research also promotes the development of inquiry learning, critical thinking and problem solving skills in learners or community, which is a framework for assessing learners in EFS. This concept would help EFS to solve problems related to sustainability because it helps to explain the empirical understanding of the world and its relationship and the consequences of people's activities on environment (Dunbar, 1996). For instance, using inquiry learning, critical analysis and problem solving skills from research; EFS would encourage learners or the community to choose an environmental issue of concern to them. Learners would use scientific research skills to investigate the chosen issue in their local context to explain the cause and effect of some contextual environmental problems in context. For example, in Malawi there is a problem of deforestation. Research in EFS would help to explain reasons for the cause of deforestation and its effects on the sustainability of the environment. Basing on the critical analysis of the findings, strategies would be developed for change of action and placing EFS in the local context to respond to the challenges towards sustainability. This activity would help to analyse values underpinning choices that people have towards the environment and action for change, which is an expression of a socially critical orientation of EFS. This would help EFS to develop reflective skills in the lives of people on the interdisciplinary nature of EFS and the environment through investigation of the physical, social-political, economic and cultural issues on the environment (Robottom, 1999). Even research conducted by Ethan (2011) advocates the use of interdisciplinary approach of sustainability for solving problems associated with sustainability.

### **A critical analysis of the role and use of cultural thinking in EFS**

The concept of sustainability encompasses all that sustains us now and into the future including and most

**CONDITION OF**

Physical life-support systems

(Biotic, ecological, abiotic)

**AND**

Human society, families, institutions, production, consumption

(Social and economic)

**DEPENDS ON**

Beliefs, values, meanings, purposes, expressions, constructions, representations

(Cultural, religion, political, cognitive)

**Figure 3.** Cultural model of sustainability. Adapted from Wilden, 1990, p. 32.

importantly human culture. Human beings are meaning makers and culture helps them make and derive meaning from the world (Dossou, 1999). Thus a culture is a perspective that determines how people act towards something. That is why sustainability requires us to critically examine our cultural choices in the light of myriad interactions of art, science, politics and economics, not simply studying them in isolation (Laszlo, 1989). This is the case because the condition of physical life-support systems and social relations is dependent on the meanings and values that humans ascribe to them as expresses through their behavior and its impacts (Wilden, 1990) as the Cultural Model of Sustainability shows (Figure 3).

**Cultural model of sustainability**

The main emphasis of the Cultural Model of Sustainability is that cultural beliefs influence the condition and potential sustainability of the society depends on how people perceive the value of the environment. This section, therefore, analyses the role and use of culture in EFS by focusing on culture as a source of Indigenous Knowledge (IK) in EFS, a basis for action in EFS and EFS as a solution to some aspects of anti-sustainability in culture.

**Culture as a source of IK in EFS**

In this paper, IK is defined as the local knowledge that is unique to a given culture or society which forms that basis for local-level decision making in agriculture, health care, food preparation, education, natural resource management and a host of other activities in the rural areas (Warren, 1991). It is influential in EFS in a number of ways. For instance, the definition of IK shows that IK is very influential for the local community in which the bearers of such knowledge live (Warren, 1991). This is made possible because IK helps to determine how

people behave in a particular society just as indicated in the Cultural Model of Sustainability described above. It provides a framework through which people act towards the environment to ensure that natural resources are used sustainably just like the individual and collective dimensions of the Four Quadrant Model (Wilden, 1996). Therefore, the integration of IK in EFS enables EFS to contextually respond to the needs of people in a particular area (Pierotti and Wildcat, 1999). IK could be a basis for grass root decision-making in EFS programmes to promote community participation in issues concerning sustainability in Malawi. This is possible because IK in EFS would help to accommodate local people's perception towards biodiversity which has stronger voice in the negotiation of natural resource management plan and conservation interventions (Lawrence, 2000). Research conducted by Maiteny (2002) adds voice to this by stating that there is an inner influence on pro-sustainability learning and behavior. This shows that what people already know has a great influence on their behavior towards sustainable use of resources.

IK would also provide EFS with the philosophy of learning from known to unknown. If EFS is to be effective, it is wise to start with knowledge that people already know about sustainable use of resources and the environment from IK in Malawi. In most cases, local people have vast knowledge about sustainable use of their environment. For example, Malawi has embarked on a programme of forest reserves and natural resource management. This programme has been successful in areas where the local communities are involved unlike in places where the programme is imposed on them because it has taken care of beliefs, values, meanings, purposes, expressions, constructions and representations that people hold towards the environment (Malunda, 2002). Through proper use of learning strategies, EFS would tap knowledge, values and skills from a bank of ready-made system of knowledge to promote local participation in sustainability, which is the focus of the definition of EFS (Zoundjihekpon, 1999) and the Cultural Model of Sustainability. Hence, EFS through

IK could help to develop sensitive environmental ethics, values and attitudes among the local people to promote the quality of the environment in the country. This is plausible because EFS would build on the local knowledge and values of people for conservation point of view and ensure compatibility with the locals (Pierotti and Wildcat, 1999). Maiteny (2002) supports this in research by stating that the likelihood that behavioral and attitudinal change founded on inner beliefs, convictions and experiences on the environment as meaningful to the people concerned is likely to last a long term. So through EFS, IK could be preserved for future generation by incorporating IK in its curriculum to ensure that traditional rights safeguard for future generation.

In addition, EFS could also consider the possibility of using strategies of passing on knowledge used by IK which is stored in a culture in various forms such as traditions, customs, folk tales, songs, folk drama, legends, proverbs and myth. Even in Malawi, societies use songs, folk tales and proverbs as ways of imparting wisdom of the society to the youth (Banda, 1982). EFS could use the strategies as tools for contextual education and methods for imparting knowledge, values and skills of sustainability to the local people as they help EFS to bring the environment alive to the people. This makes EFS reflect the cultural context of people in education and enables active participation of people in teaching about the environment because people could use folk tales, songs, proverbs and legends existing in the community to learn potential values for sustainability (Pierotti and Wildcat, 1999).

#### **EFS as a solution to some aspects of anti-sustainability in culture**

The emphasis of EFS is participation in issues of sustainability from everybody in the society, which could be achieved through equal access to education for people to gain knowledge, values and skills to participate in sustainable development (Lummis, 1995). However, there are some cultural values and beliefs in Malawi that are in conflict with equality and justice on opportunity to education. For example, in our culture, most families are patriarchal and males control and dominate the home, workforce and the communities while women have low status in the society (Ibhawoh, 1999) and are prepared to be responsible for domestic chores. This belief has created an attitude that negatively affects girls' education (Kadyoma, 1997). This is a clear reflection of the Four Quadrant Model (Wilden, 1996) because it has developed a perspective on which people base their action on education. This does not promote equality and justice on access to education because priority is given to boys as they are prepared to lead families in future. This perspective marginalizes females from education who consequently face problems to participate in issues of sustainability due to lack of knowledge, values and skills.

Therefore, EFS in this cultural setting would be a solution to provide education for the marginalized women in the society through adult education, youth education and community education. These forms of education challenge those values in the society that need radical reform and social change (Confintea, 1999a) towards sustainability. Consequently, this would promote equality and justice for the culturally marginalized to access education and have knowledge, values and skills for participation in sustainable development.

#### **Culture to be used as an instrument for basis of action in EFS**

Local cultural identities and values shape the way people live and determine their responsiveness to educational programmes and the degree to which they feel involved in preserving the environment for future generation (Dossou, 1999). If EFS is to build an effective global approach to sustainability, it, therefore, needs to address people with discourse about their cultural background because culture is a lens through which people give meaning to the world and instrumental to the way people behave towards issues of sustainability as outlined in the Cultural Model of Sustainability. The instrumental aspect of culture is key in EFS in trying to influence change in people's behaviour, attitudes, values towards sustainability because it defines how people relate to nature and their physical environment. For example, in Malawi, there is a cultural belief that grave yards are homes of spirits as such people are not allowed to cut down trees from them and disturb the biodiversity (Salanjira, 2003). This has promoted a cultural way of conserving ecology in some parts of the country towards sustainability. This is a reflection of a social practice conferring important cultural and spiritual values on biodiversity expressed in beliefs about divinities and diverse elements on the universe and veneration of ancestors (Zoundjhekpon, 1999). EFS should promote such cultural values, beliefs and practices because they foster ecological conservation (Perez de Cuellar, 1996) to promote participatory approach from the grass root in issues of sustainability through formal as well as informal education.

However, despite culture being instrumental, there are some aspects of culture that do not promote sustainability. For example, consumerism believes that people uses the environment for economic gains without considering the aspect of sustainability (Harmatan, 2001). This is a belief of get yours before everybody else can and has led to ecological destruction. The incorporation of cultural thinking in EFS would help EFS to encode values such as frugality, respect for environment, and acceptance of responsibility to participate in sustainable issues, social equity and justice in the society and respect for diversity among others into cultural beliefs that would promote sustainable development. It is worth



pointing out that this may not be easy because deep rooted habits of thinking and acting require radical change and a discovery of fresh framework to make sense in order for people to adopt new values and attitudes towards something (Maiteny, 2002).

## CONCLUSION

The article has critically analyzed the role and use of scientific and cultural ways of thinking in EFS to promote sustainable use of resources in Malawi. In the article, I have argued that EFS needs to be based on interdisciplinary sustainability science and cultural thinking. The discussion has also unveiled the relationship between science and culture in issues of sustainability and development. On one hand, Science gives the theoretical aspect of the interconnectedness of issues in sustainability on one hand, which acts as a basis of understanding and justification of interdisciplinarity in EFS. On the other hand, culture acts as a perspective through which people make meaning of the world. This determines their course of action towards issues of sustainability because it looks at values and attitudes of people in the society, which is vital for isolating related skills in teaching and learning of EFS to promote participation from everyone in the society.

Therefore, from this discussion, it is vivid that cultural and scientific ways of thinking are inextricably linked and complimentary in sustainability. There are some elements of culture, which are mutually found in science. For instance, the concept of IK is crosscutting and has some elements of science and culture. From African perspective, IK is science because it shows what they are able to do and from the Western perspective, it is culture because it does not explain how things happen. I feel this is just an excuse for the western to deny IK a scientific status. Therefore, the knowledge of the intersection of science and culture enriches the concept of EFS because it promotes partnership among various stakeholders such as scientists, local people among others in dealing with sustainability issues as the focus of EFS is participation from all the stakeholders irrespective of their disciplines in the society.

## RECOMMENDATIONS

From the discussions and the theoretical model of EFS in this article, my passion is to see that the share of resources for the future generation is not compromised. People should develop skills on how they can use the environment in a manner that promotes sustainable use of resources. This is possible if the country has a team of people that have the knowledge of EFS and how this promotes sustainability. Based on this, I propose the following recommendations:

1. Curriculum development institutes of countries should

integrate EFS into the curriculum at all levels. This is very crucial as the context of EFS is all forms of education. It is through education that the communities can be empowered with knowledge, values, change in attitude and skills to participate in sustainable use of resources.

2. Governments, communities and other relevant stakeholder should improve and increase the fundamental understanding of the linkages between culture, science and natural environmental systems through formal and informal education, improve the analytical and predictive tools required to better understand the environmental impacts of development options by:

- (a) carrying out research programmes in order to better understand the carrying capacity of the Earth as conditioned by its natural systems, such as the biogeochemical cycles, the atmosphere/hydrosphere/lithosphere/cryosphere system, the biosphere and biodiversity, the agro-ecosystem and other terrestrial and aquatic ecosystems;

- (b) developing and applying new analytical and predictive tools in order to assess more accurately the ways in which the Earth's natural systems are being increasingly influenced by human actions, both deliberate and inadvertent, and demographic trends, and the impact and consequences of those actions and trends;

- (c) integrating physical, economic and social sciences and culture in order to better understand the impacts of economic, science and social behaviour on the environment and of environmental degradation on local and global economies.

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