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Curriculum Issues: Teaching and Learning for Sustainable Development in Developing Countries: Zimbabwe Case Study

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Abstract

The study sought to investigate curriculum issues, teaching and learning for sustainable development in secondary schools in Zimbabwe. Education for sustainable development (ESD) aims at changing the approach to education by integrating principles, values, practices and needs in all forms of learning. Literature has documented the importance of problem solving, ecologically relevant education, project based and interactive education as the basis for sustainable development. Emphasis has also been placed upon the pedagogical and curriculum issues in support of sustainable teaching and learning in developing countries. The methodology employed included literature search, documentary analysis, questionnaires, interviews and observation. The study was based on two urban and two rural secondary schools. The results revealed that some schools followed a seriously integrated curriculum where academic work was integrated with industry based education or learning, while others followed a purely academic curriculum. Results showed that pursuing an academic curriculum led to relevant careers though unemployment was high due to the lack of skills. The high rate of employment of those pursuing integrated curriculum appeared to be a motivator. The study concluded that an integrated curriculum and education was more beneficial for sustainable development and entrepreneurship. Further research is required on the curriculum and strategies for education/industry integration for sustainable development and challenges schools face in trying to implement ESD.

Keywords: sustainable, curriculum, integrated, development, pedagogical, learning, teaching, education, ecological, school types, employment, problem solving

1. Introduction

According to Wong (2003) sustainable development is regarded by many as an essential direction for the whole world to move towards., However, he noted that educating for sustainability was not easy hence all practitioners should make concerted effort to contribute towards its success. Coping with changes in society and the demands for multi-disciplinary delivery of education was not easy either. An integral and practice-oriented approach of the subject area was vital for the success of education for sustainable development. The success would however, depend on leadership empowerment as a tool bringing about change at institutional level. There is therefore, growing pressure on schools to teach learners for sustainable development in developing as well as developed countries (UNESCO, 2005). There is an increasing outcry over the irrelevance of the education given to the children today. Employers on their part have expressed dissatisfaction over the lack of basic skills and work ethics among many school leavers. This has led them to label the education currently provided by the education system as irrelevant. School leavers are unemployable. If employed they become an unbearable cost due to the fact that they need to be trained or a lot of time is spent showing them how to work. This is a cost on the employers which they are not willing to pay. Generally, employers want what they call “critical thinkers” (UNESCO, 2005). How can schools produce critical thinkers? What is being said in short, is that the education, and in particular the teaching and learning as experienced in our schools and educational institutions cannot sustain development. To answer the question, it is important that a critical look be taken on pedagogy, the curriculum, the learner and the environment. This paper therefore, seeks to describe and analyse teaching and learning for sustainable development in developing countries, with Zimbabwe as an example. Though focus is on the latter, the resulting information will equally apply to developed countries as well.

2. Literature Review

2.1 Pedagogy

This refers to the way the curriculum is taught and all the methodological aspects of learning and teaching. It is argued that work related learning is sustainable because of its symbiotic link with the environment. However, purely academic education if strictly confined to the classroom is detached from the environment hence not sustainable. The success of pedagogy in sustainable development will be determined by whether teaching is problem or enquiry based, project driven, fosters collaboration and critical thinking. If teachers plan their lessons around these concepts and ideas, then the outcome is likely to lead to sustainable development (Capelo et al., 2014; Mukuria & Obiakor, 2008; Dearing, 1999; Khali et al., 2013; Treare et al., 2013; Daniel, 2008; Darley & Farley, 2003).

Furthermore, if teaching is planned and focused on problem solving and is practical as happens when projects are used, then it can be described as ecologically relevant. It has practical application to solve problems in the environment and a clear link is established between teaching, learning and the environment. Such an approach encourages learner interaction, and for the learner, teacher and the content/curriculum interaction too. This deepens the learning experience involving everyone including the community in which the school is located. Outcomes of education are clearly visible to the community and is viewed as relevant hence complementary to sustainable development (Diamond, 2005; Darley & Farley, 2003; Dearing, 1999; Capelo et al.).

Similarly, in their planning teachers should ensure that learning and instruction is learner-centred. In other words, focus should be on maximum learner involvement with the teacher giving direction and support. Curriculum should be parcelled up in such a way that a learner-centred approach is possible hence the relevance of project based, problem solving and enquiry based learning approaches. Strong components of fieldwork, practical work will achieve the objective of teaching and learning for sustainable development. However, this can only take place effectively where an integrated education system is in operation, that is, education and industry working together (Dearing, 1999). This can happen if the policy framework is supportive of such integration and is well co-ordinated in the way it is implemented and practised (Wade, 2008). This form of teaching enjoys the benefit of stimulating learner motivation, being more meaningful, easy to understand while the purpose of education is easily appreciated by both learners and the community since knowledge and skills can be seen in application for problem solving (Capelo et al., 2014; Joseph, 2013; Treare et al., 2013; Dobson & Tomkinson, 2012).

However, in order for the teaching and learning to be relevant, attention should be paid to learning activity design. This should begin with needs assessment. This establishes exactly what every learner's needs in the learning environment are, what competencies should be developed. From these, the teacher's role can be designed so that appropriate approaches can be designed and how learners will participate in the learning process. This, once again requires that the teacher examines the environment how it can be incorporated in the teaching, making learning relevant to the local environment, what learning outcomes are expected, the nature of the learners and other learning materials, people and issues. Planned in this manner, teaching and learning can only be described as addressing real life issues and becomes sustainable to local needs. In their study of problem based learning (PBL), issues involved in designing appropriate problems or scenarios suitable for ESD were examined. They concluded that use of interdisciplinary problem based approaches to embed sustainable development in the curriculum was desirable. (Dobson & Tomkinson, 2012). The views are corroborated by Cruickshank and Fenner (2012) in a study that explored sustainable development themes through learning activities in higher education. They reported that exercises and assignments should be designed to encourage learners to test their own abilities and assumptions as they developed their competencies. Activities had to support formal lesson delivery such as fieldwork, role plays, games, systems thinking. Attention should also be paid to the learning environment for its suitability for developing awareness and relevant skills. They concluded that effective learning took place where there was mutual support as well as adoption of holistic teaching approaches that included assignments, class activities, lectures and access to materials. On the whole, the use of different pedagogical approaches was regarded as vital for success. There was a need to link the classroom and the real world.

Brundiers, Wiek and Redman (2010) investigated opportunities to link classroom activities with the real world, key competencies such as problem-solving and collaborative skills needed for sustainability. The study demonstrated the importance of linking knowledge to action, collaborative work and application of concepts and methods from the classroom to the field for sustainability. There were however, challenges associated with implementation, organisation. Collaboration, co-ordination and integration were identified as critical success factors. By integrating classroom activities with real world activities, acquisition of key competencies in

sustainability is enhanced. Kearney and Zuber-Skerritt (2012) endorsed the idea but referred to it as extending learning organisation to learning community. This meant that not only should the focus be on the learners in the school or college but the entire community should be involved through lifelong learning especially in disadvantaged communities. Such an education approach would bring about change at personal, professional, team and community levels through participation, action learning and action research (PALAR). The study however, noted that lack of understanding by government agencies who promote education was responsible for poor appreciation of the value of ESD. This has led to community disadvantage evidenced by high unemployment and crime rates and exclusion from mainstream economy and even higher education. Members of the community needed help to help themselves to achieve positive change through quality learning in partnerships with researchers. Results of the studies underline the importance of planning for successful implementation. A learning framework is considered further to enhance education for sustainability.

In their study, on how transformative sustainability learning could be achieved, Sipos, Battisti and Grimm (2008), reported the need to engage the head, hands and heart as key organisers of learning for sustainability. They argued that use of head, hands and heart as organisers of learning enabled the integration of transdisciplinary studies. They expounded the learning framework as follows; transdisciplinary study involved the head (planning and concept building), development of practical skills (hands), translation of passion and values into behaviour in life and work situations (heart). While this happens, the cognitive landscape for understanding the transformative sustainability learning framework would be enhanced as a unifying framework as part of the pedagogy. This would be followed by inter-disciplinary, practical and/or place-based evaluation of any course or programme based on appropriate learning objectives. Employing a learning framework such as this will ensure achieving a balance between cognitive, psychomotor and affective domains, key to education for sustainable development embodied in transformative sustainability learning principle. This approach is probably the missing link in Zimbabwe's education system leading to outcries over irrelevant education system. The teacher, among other elements is the key to the success of implementing education for sustainability.

Planning helps the teacher define roles more clearly, both input and outputs. The teacher may decide to act as a mentor, designer who provides scaffolding to the less significant others (learners), identification and selection of relevant tools or easy access to the tools, models, examples and rubrics, facilitator and trainer of participants who are the learners. Thus, for sustainable learning and teaching, teachers carry out needs assessment, organise the needs to help determine content, conduct workshops to prepare for delivery, monitor activities and evaluate the outcomes (Mukuria & Obiakor, 2008). The success of teaching and learning for sustainable development would dependent on a thorough appreciation of the components of effective teaching and learning. These are presented below.

Aborisade (2013) identified three key components of effective teaching. These are technological, content and pedagogical knowledge. These are dealt with separately in the following paragraphs (See figure 2).

Once learning needs have been identified, teachers should decide on the technological knowledge they need for successful learning to take place. This involves deciding on appropriate equipment, gadgets and tools they may need to facilitate delivery of the lesson. Such an understanding is said to help make lessons more interesting, engage the learners by seeing, manipulating and simplifying language. Such technological knowledge helps by involving learners in practical work which creates a lasting impression as well as help in problem solving and making learning more meaningful for both the fast and slow learners (Ratiu & Anderson, 2014). This is only one step towards delivery of an effective lesson. One can have technological knowledge but without knowledge of the subject matter or content in which case not much can be learnt because the lesson will lack substance and focus.

Subject knowledge also known as subject competence is vital for successful lesson delivery. The ability to identify and use technological knowledge would go a long way if the teacher has knowledge of the content to be taught. Subject knowledge would enable a teacher to select what is worth knowing and what is not, choice of appropriate strategies for its presentation and how to facilitate for the gifted and talented and the less gifted. The teacher will be able to identify aspects of the environment that can be incorporated in the lesson for ecological relevance, what can be done more successfully using projects, practical, theory and problem solving strategies (Joseph, 2013; Capelo et al., 2014; Mukuria & Obiakor, 2008; Khali et al., 2013, Dearing, 1999). Deciding on time allocation and parcelling up different parts of the curriculum becomes easier. Such knowledge goes a long way in ensuring effective teaching and learning. However, both technological and content knowledge can only contribute to effective teaching and learning if teachers have pedagogical knowledge.

Pedagogical knowledge describes the teaching methods or strategies of lesson delivery. Teacher training programmes have incorporated pedagogy for their students. Trainee teachers should be exposed to a variety of methods of delivery, curriculum design and assessment to promote learning for sustainable development. It is the responsibility of every teacher to plan and identify appropriate delivery methods for every section of the curriculum. The more varied methodologies the better in fulfilling the different learning styles. The methods include, lecture, practical, workshops, tutorials, use of computer software, project based ad computer assisted. Whatever method is chosen, it must be aligned to learners' needs the content and what the environment offers (Khali et al., 2013; UNESCO, 2005). All these need to be integrated for successful teaching and learning for sustainable development. A teacher with pedagogical skills will be capable of coming up with instructional systems design. The latter comprises the learners' profiles (What the learner needs to know); objectives and outcomes (what the learners need to know); learning attitudes and skills (what can facilitate learning) and assessment (How the learner has learned the content). Consideration of all these will ensure a complete learning menu that addresses individual and community needs. All the questions and considerations should be made in the context of learner-centred learning and teaching. This comprises content, interaction, instructional strategies, assessment and the environment which ensures learner engagement. An approach such as this will lead to sustainable learning and teaching, leading to better economic development in the developing countries (Tribe, 1999; Oborisade, 2013).

An examination of the implementation of ESD shows that aims and objectives can be right but effectiveness may not be achieved. Kitamura and Hoshii (2010) in their study of ESD found out that implementation of ESD lacked coherence with education reforms at school and local levels. This meant it was irrelevant. They reported that emphasis was given to environmental sustainability hence very narrow. Wider issues such as climate change and an integrated curriculum were neglected. Practitioners did not agree on how to effectively implement ESD. Guidance for learners to acquire cross-disciplinary perspectives was inadequate. While much has been done to demonstrate implementation of the ESD programmes, not much has been done to highlight the constraints individual teachers and institutions were facing in promoting ESD.

2.2 Statement of the Problem

Learning leads to change of behaviour. Teaching facilitates the learning process. There are different ways by which learners learn and teachers teach. Some of these lead to a more permanent change of behaviour which has an impact on the environment, lead to critical thinking, problem solving and show a clear link with community needs. It is relevant to the local environment hence those going through such an education system are able to fit in the socio-economic environment when they leave school. Failure to do so leads to what the employers describe as irrelevant education in terms of development needs of a country or community. It is against this background that the study sought to answer the research problem. What forms of teaching and learning lead to sustainable development in developing countries?

2.3 Purpose of the Study

It is against the above background and rationale that the study sought to investigate the type of education that leads to sustainable development. In order to answer the research question and address the aim of the study. The following objectives and research questions were presented and investigated.

2.4 Objectives

The aim of the study has been further split into specific objectives: To investigate the role of:

1) Pedagogy in sustainable development;

2) Curriculum in sustainable development;

3) Learning methods in sustainable development;

4) Education policy on sustainable development;

5) Technology on sustainable development.

2.5 Research Questions

1) What teaching and learning strategies lead to sustainable development?

2) What curriculum contributes to sustainable development?

3) What is the role of technology in education for sustainable development?

4) What role does the environment play in education for sustainable development?

5) What role does policy play in education for sustainable development?

2.6 Assumptions

The study assumed that there were schools that offer the national curriculum differently. It was assumed that information from schools on curriculum and curriculum implementation would be readily available and that members of the community, and other respondents would be willing to provide information on how they are experiencing the curriculum and its impact on economic development in the local area and the country as a whole.

2.7 Significance of the Study

The study sought to highlight the nature of the curriculum that promotes sustainable development, the way the curriculum is delivered and learners experience the curriculum contributed to sustainable development. It was hoped that the results would influence how teachers implement the curriculum, policy formulation and how students learn. In particular, the employment of learner-centred approaches relevant to the environment. Consequently relevance of education to the needs of developing countries will be enhanced leading to greater motivation to learn and collaboration with industry and community.

3. Methodology

This was a qualitative study using a case study research design. Qualitative, because the study sought opinions and experiences of people involved in education. A case study research design was preferred because it enabled the researcher to select schools that delivered education in different ways and to children in different localities, rural and urban. Document analysis especially, Ministry of Primary and Secondary Education policy on syllabus or curriculum documents used by the different schools, assessment records, reports, minutes of school and departmental minutes were some of the sources of data. Interviews provided additional information on the experiences of curriculum implementation. Interviews were conducted with heads, heads of departments, teachers, learners, members of the community, employers/stakeholders and parents. Literature review, document analysis and observations guided the interviews. Where time was inadequate to attend interview, a qualitative questionnaire was completed by learners and teachers seeking their opinions on their experience of education and what they would recommend be done in future. Respondents were selected from the different schools in urban, rural areas practising largely academic curriculum and those following and integrated curriculum working with industry and community and opinions on sustainability of the education being offered. Document analysis, interviews and observations focused on the following issues: Aims and objectives of the education, curriculum, subjects offered by different schools, teaching and learning methodologies, community involvement, evidence of integration with industry, opinions on relevance and sustainability of the education being offered. Learners, teachers, heads and parents in schools offering academic and integrated curriculum were the respondents. Responses from the participants were used to analyse the extent to which education offered in a developing country such as Zimbabwe supported sustainable development locally, nationally and globally.

Questions such as: What subjects were taught in this school? How do these subjects help the learners after leaving school? Is there a link with industry or other economic activities in the locality or country? How does the teaching link with the locality and country? What is the reaction of parents to the education provided in the school? What is the reaction of industry when schools work with them as part of their education? How can education lead to sustainable development? What should schools do to contribute to sustainable development? What does the community say about the relevance of education offered? What improvements need to be made to make education contribute to sustainable development? What suggestions can you give for the education to contribute to sustainable development?

4. Results and Discussion

The Education Act 1987 (amended in 2007) was examined to find out the national policy thrust or focus. It was observed that the Education Act merely mentioned the ideology to guide education provision and not the type and focus, namely “education as a basic human right and that the curriculum would be common for public and independent schools”. However, in its Medium Term Plan (2011-2015), the government was more specific in its education policy focus which made specific recommendations about the curriculum and the need to review the latter. For example, it was stated that the purpose of the curriculum review was intended to revise and implement a curriculum that would lead towards the achievement of revitalisation of learning quality and relevance. Results agree with Capelo et al. (2014) who emphasised the need for relevant education for sustainable development. It was also emphasised that regular review of the curriculum (curriculum innovation) was necessary in order to ensure that the curriculum remained relevant to meet the attributes of individuals, the economy, society and

challenges of the future. (Ministry of Education, 2011, Mukuria & Obiakor, 2008). To this end, the Ministry of Primary and Secondary Education would conduct a comprehensive curriculum review in order to bring it up to date (curriculum innovation) by placing greater emphasis on vocational subjects that included sports, arts and culture related subjects, civic education which also focused on the environment. The terms of reference for Curriculum Development Unit (CDU) which was tasked to conduct the review (2012-2015) underscored the government sentiments for an education system that would support sustainable development of the country and the world. Policy framework support was described as vital for an education for sustainable development. What is presented below supports Wade (2008).These were to:

(a) Develop a framework for curriculum in Zimbabwe which reflects the Zimbabwe context and is consistent with internal trends and standards. Mention of "reflect the Zimbabwe context" implies that the education system must support Zimbabwe's development needs. "Consistent with the international trends" means the education system must not only support Zimbabwe's development needs but those of the world or global village too. Viewed from this perspective it is clear that the curriculum for the Zimbabwe education system is intended to achieve sustainable development for the country and the world. It remains to be seen whether what is happening in the schools reflects the policy thrust.

(b) Develop and implement a process to identify the strengths and weaknesses of the current curriculum using the framework for curriculum in Zimbabwe as the principal frame of reference. The latter is an acknowledgement that good policies are at risk of not being implemented hence the need to see implementation take place.

(c) Provide a detailed analysis of quality of current curriculum as defined by the scope outlined in Section 3.0, and

(d) Make evidence based recommendations that will provide specific guidance for revision of the curriculum and improvement of related structures and processes within realistic time frames and resource expectations. Thus, monitoring quality and use of research evidence to inform reviews would ensure that the curriculum remains relevant to current needs and continue to support sustainable development of the country and the world.

(e) Learning activities and tasks should include project work in all the subjects. Research in other countries has demonstrated that the use of project work in learning and teaching was vital for education for sustainable development (ESD) (Daniel, 2008; Dobson & Tomkinson, 2012; Cruickshank & Fenner, 2012). The Zimbabwe Education system has in mind their idea of education contributing to sustainable development through teaching and learning activities. This is an example of pedagogy contributing to sustainable development.

(f) Ensure that schools and learning environments including extra-curricular focused on competence development and not just traditional knowledge acquisition. This implies that if school leavers are competent in some field in their environment they will be able to make a substantial contribution to the development of their locality and cumulatively to the whole country and the world. This supports views by Tribe (1999) and Daniel, (2008) on the importance of education relevant to the environment and emphasis on performance through education. It is argued that competent learners were able to mobilise their knowledge, skills and attitudes independently and creatively to address different challenges and solve problems effectively through teacher/learner, learner/learner interaction as well as school /learning environments and communities also called collaborative learning (Daniel, 2008).

(g) Similarly assessment should reinforce curriculum implementation by focusing on demonstration of competence rather than just knowledge. Asking questions such as why, what, how and how well will develop sound learning habits for sustainable development. This can only be achieved if the curriculum is personal and societal development-centred education system. Content and methods therefore, should differentiate learning based on the curriculum (formal/non-formal or the unintended and not subject to assessment and social recognition and emphasised by UNESCO (2005) and Khali et al. (2013), Jabareen (2008).

(h) Many authors, including Jacobs have stressed the need for regular adjustment of the curriculum to the times in which we live while preparing for the future as well. Jacobs (2009) underscored the view when he said:

"We need to overhaul, update and inject life into our curriculum and dramatically alter the format of what schools look like, match the times in which we live. Our responsibility is to prepare the learners in our care for their world and their future. There is rising concern about 21st century skills and tools for our learners."

i) The above can only be assured if the following questions are asked about the curriculum: Does the curriculum foster competencies (knowledge, skills and attitudes-openness and critical thinking, tolerance and respect, and holistic personal development)? Is it relevant? Is it feasible? Is it assessable? Are there school/community links

and integration of school and labour market? Is it practically problem-solving oriented? Is it challenging and motivating? Does it integrate stakeholder views? Does it encourage involvement of stakeholders? Does it foster school/community (community service, project work, counselling and orientation) participation?

ii) Assessment should ensure that learners are aware of learning objectives, requirements and that they are able to select appropriate assessment means.

iii) Test of practical and problem-solving orientation curriculum are: Is the learning content relevant to learners' experiences and environment? Are there appropriate links between theory and practice? Are higher order intellectual and problem-solving skills being fostered? Is there co-operation and team work? Is the content fostering connection with daily life experiences? Does the learning content clarify challenges and opportunities in the labour market (technology, entrepreneurship skills)? Does learning content facilitate orientation with regard to further studies?

Key competencies vary from country to country. This is a reflection of the country's needs for sustainable development. For example, New Zealand covers the following in their education: communication skills, numeracy, information, problem-solving, self-management and competitive skills, social and co-operative skills, physical skills, work and study skills. Scotland seeks to achieve the following outcomes from their education: successful learners, confident individuals, responsible citizens and effective contributors. Singapore: communication skills, character development, self-management, social and co-operative skills, thinking skills and creativity, literacy and numeracy, information skills. What are Zimbabwe's needs in terms of education for sustainable development?

Whatever competencies are valued by any country it is important that integration of new, emerging issues and cross-cutting objectives are achieved for sustainable development. For example, consideration of integration compared with new subjects (Dearing, 1999; Kitamura & Hoshii, 2010). Carrier subjects such as HIV in Biology, health in science-learning objectives, content and outcomes for each subject (ICT). Relevant and emerging and cross cutting issues are integrated in the curriculum for example, HIV/AIDS, intercultural education, citizenship, climate change, disaster and risk management (DRRD), peace education and conflict resolution. The challenge is how to integrate them.

Achievement of challenges faced by schools in dealing with most emerging and cross cutting issues is immense.

Consideration of their impact, effectiveness and presence in the curriculum focuses on the following and seeks to address these questions: Have they contributed to competency development, changes in awareness, attitudes and behaviours? How are learning processes and outcomes assessed?

Answers to these questions should test the suitability of education provision for sustainability.

Having looked at the policy framework, case studies of four schools were conducted to find out how far they were implementing ESD. As stated earlier, two schools each were in rural and urban areas respectively.

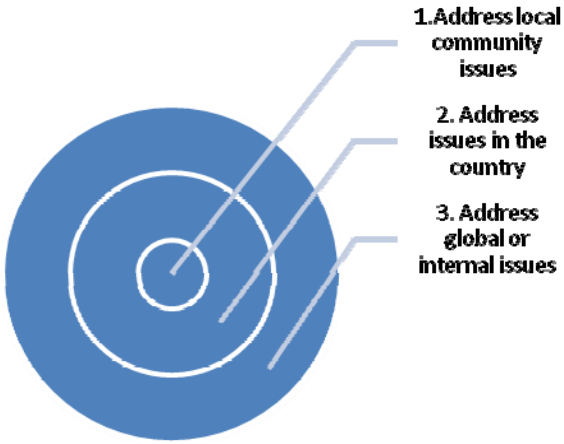

Figure 1. Ecological structure of curriculum for sustainable development

Source: Ignatius Isaac Dambudzo, 2014

Figure 1 shows the structure of a curriculum which can address sustainable development issues at any one time. For example, the concentric circles show both the ecological structure and approach teachers and learners should take whenever examining any topic in the syllabus. The inner circle is the local or immediate environment, followed by the wider environment such as the province or country and finally the most distant environment-region, continent or the global village. The study of any topic that adopts the approach above can only lead to sustainable development, everything else being equal. The link to the environment at different scales, incorporation of environmental issues in teaching and learning and the use of relevant teaching and learning approaches such as problem-solving, projects, practicum, work related-learning can only enhance understanding of the world we live in and enhance the ability to solve problems for a better life. In the case study of schools studied, it was observed that schools A and C generally adopted the curriculum and implemented it in a manner that promoted sustainable development for the country and the world as well. The urban school with an academic and practical curriculum implemented the curriculum using different approaches as shown in table 1. The approaches made teaching and learning relevant to daily experiences of the learners, enabled learners to identify themselves with their community. Every topic was studied in the classroom and outside. The link with the local environment made learning more meaningful, interesting and easy to apply knowledge and skills to solve local problems. Project work, problem solving, investigation of issues in the local environment (Problem based learning (PBL)), field trips all made learning and teaching ecologically relevant, thereby promoting sustainable development as outlined by Darley and Farley (2003) and Joseph (2013). Examination of issues in the wider environment (mesosphere) enables learners to tackle problems beyond their own immediate areas hence sustainable on a global scale. This makes the education contribute to sustainable development at local and global scale. Figure 1 also illustrates the way teachers should approach every topic. This is the concentric or ecological approach. It makes learning more meaningful and helps learners understand more easily because they can associate issues in distant areas with those nearer home making teaching and learning sustainable, leading to development. This can however, happen if teachers can be guided through the curriculum, policy implementation as stated by Treare et al. (2013). This should be further emphasised during teacher training by developing appropriate pedagogical skills that are ecologically and environmentally relevant. All the activities planned for the learner should emphasise the importance of the local environment and interrelated nature of phenomena and the value of an interdisciplinary approach to teaching. Compartmentalisation of subjects should be avoided to enable learners to see how each subject complements others. This enriches the learning experiences thereby enable education to contribute immensely to sustainable development of the local area, country and the world. The examples quoted above demonstrate the importance of ecology and integration in education for sustainable development.

On the other hand those in the rural school C integrated their learning with industry. This is a school located on a tea estate. In their Geography, maths and science lessons teachers take the learners to the tea estate to observe the tea plants from the germination to picking stage and later processing of the green leaf to the cup of tea. In fact learners participate in the work at the tea plantation. This approach can be described as integration of academic and industry (Capelo et al., 2014; UNESCO, 2005; Tribe, 1999; Dearing, 1999; Treare et al., 2013; Meadows, 2004). It makes education more purposeful, relevant and meaningful. Some get employed on the tea plantation on completion of their secondary education. It is the teaching approach adopted by the teacher and the philosophy to link theory with practice which promotes education for sustainable development. However, in some countries, working on the tea plantation may be regarded as child labour yet in a developing country scenario the practice provides deeper understanding of concepts, hands on experience to sustain the tea plantation from year to year, and providing livelihood from generation to generation hence sustainable development. This is the same idea described by Brundiers et al. (2010) as extending the classroom to the real world or what Kearney and Zuber-Skerritt (2012) described as from learning organisation to the learning community. However, the success of offering such an education system would depend on the presence of components of effective teaching and learning: technological, content, leadership and pedagogical knowledge as illustrated in Figure 2.

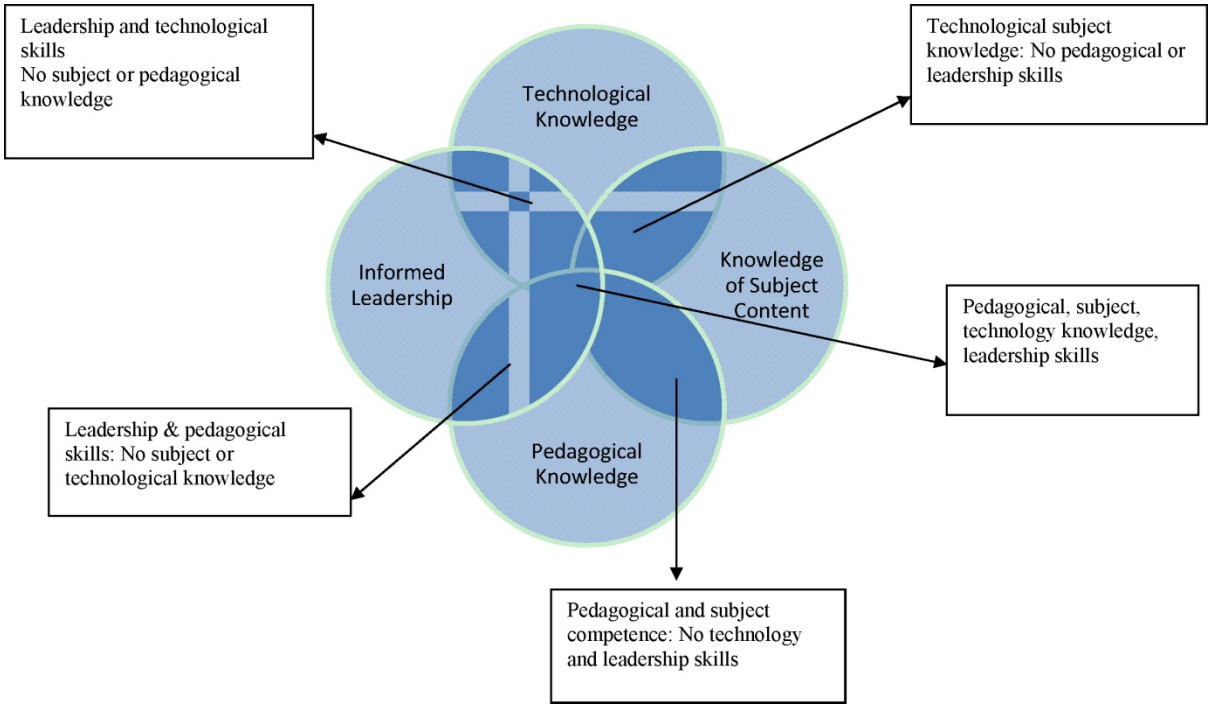

Figure 2. Components of effective teaching and learning

Source: Ignatius Isaac Dambudzo, 2014

Table 1. Curriculum offered by different schools

Education Area	SCHOOL A (Urban)	SCHOOL B (URBAN)	SCHOOL C (RURAL)	SCHOOL D (RURAL)	COMMENTS
Curriculum	Academic and practical	Academic	Academic, practical and work related learning	Academic	Schools have a choice of what to offer to their learners
Pedagogy	Lecture, Project based, Work related learning, Learner and teacher-centred, Computer assisted, Community based, Problem solving and Evidence based	Theoretical and teacher- centred	Theoretical Learner- centred Practical work Work related/ Industrial Attachment Project based Problem solving Environment linked	Theory Homework Written work Teacher-centred Cramming Knowledge acquisition	Urban A and Rural C use approaches that support sustainable development. B and D concentrate on factual knowledge with no skills for self- and community support. The environment, industry and community are not linked to the learners' education experience. Unemployment and lack of entrepreneurship lead to frustration of graduates. Little or no contribution to the community and country. Contribution to sustainable development is minimal. Problem solving skills are limited.

Learner Activity	Problem based learning activities	Written work, tests of a theoretical nature	Integrated academic classroom-based work	Written work and tests of a theoretical nature	Academic curriculum encourages rote learning to pass examinations.
Assessment	Practical, theory and project and skills based assessment	Theory assessment focusing on knowledge and comprehension	Practical, project work and theory assessment	Written work, theory testing knowledge acquisition and comprehension	Tracks A and C promote meaningful learning and skills development leading to sustainable development

Urban and rural schools B and D respectively concentrate more on getting the highest number of top grades in examinations. Rote learning is employed. Drilling and coaching for examinations dominate. There is no time for reflection on what has been learnt. Engagement in problem solving, project work and use of environment as learning and teaching strategies are regarded as a waste of time. Desire to complete the syllabus as quickly as possible is a pre-occupation. Collaborative learning activities are an interruption of the academic programme. Indeed the learners come out with very high grades but very little of what has been learnt can be applied in real life situations. While the high school graduates gain entry into higher education more easily because of their high points, finding employment on completion is a big challenge due to lack of critical thinking, problem solving and irrelevant knowledge which today's employers demand. Such an education system cannot lead to sustainable development. As can be seen this is in contrast to what is happening in schools A and C. The latter schools do not get publicity for their achievements and worth giving the impression that the education provided by these schools is inferior.

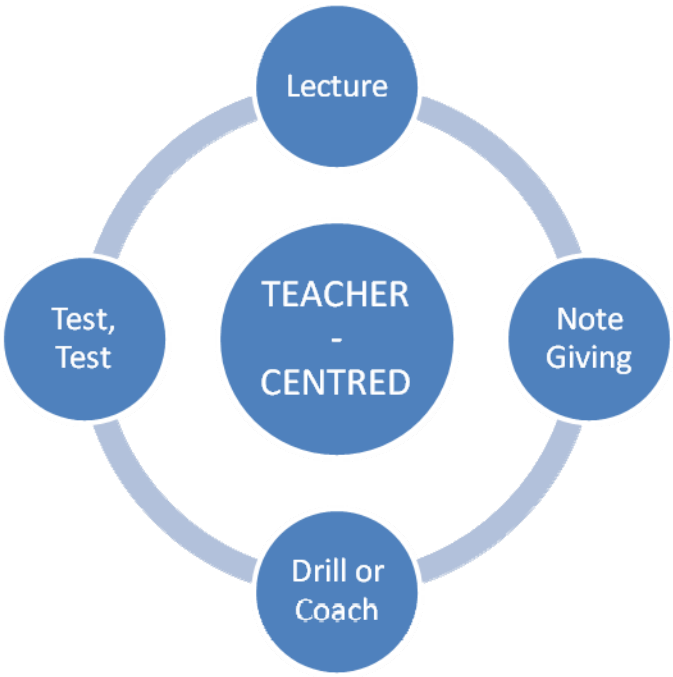

Figure 3. Teacher-centred learning and teaching (schools A and D in table1)

Source: Ignatius Isaac Dambudzo, 2014

The activities in this strategy do not yield education for sustainable development as described above. Figure 4 shows an example of a learner-centred scenario which can lead to education for sustainable development

compared with Figure 3, and schools A and D in table 1 which show domination of teacher-centred teaching methods which do not always promote ESD.

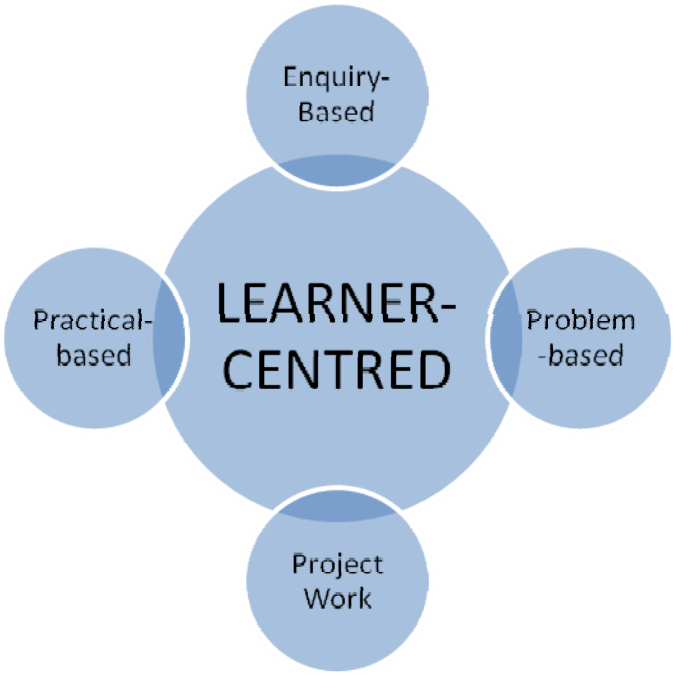

Figure 4. Learner-centred teaching and learning activities

Source: Ignatius Isaac Dambudzo, 2014

Note that the activities have a symbiotic relationship with the learner in the middle. Planning has focused on maximum engagement of the learner through enquiry/critical thinking, problem solving, project work in the environment and some practical work. Thus, the learner develops competencies during schooling and grows to understand the local environment and its challenges. This is education for sustainable development in demand in both developing and developed countries. Such an education is only possible if teachers design instruction based on identified learners' needs-what the learner needs to know, skills and attitudes required to facilitate learning and continuously assessing to determine how well each learner has learned and developed the desired skills. Figure 6 summarises the instructional design which can guide the teacher. The diagram shows that a needs based teaching and learning programme leads to continuous improvement leading to sustainable development because it addresses current needs of the individual and the local environment, global and future issues as well (See Figure 5) for the teaching learning process for sustainable development. The approaches illustrated in figure 5 may be time consuming but their long term effectiveness and impact cannot be underestimated. Key characteristics of teacher-centred methods are: Approach-Expository: Teacher talk; purpose is to transfer knowledge while learners listen (See figure 3). On the other hand learner-centred strategy ensures learners are empowered to seek and acquire knowledge and skills with the teacher acting as the facilitator and guide throughout.

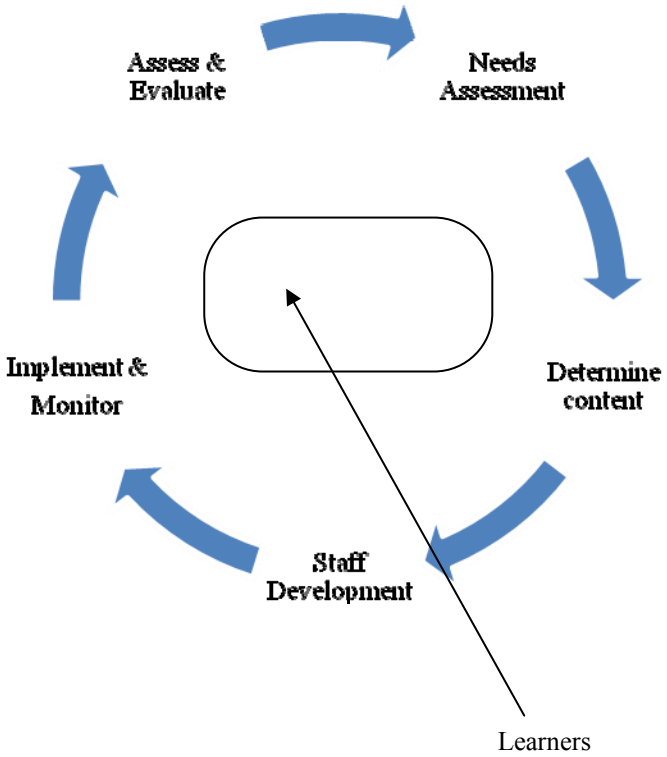

Figure 5. Key processes in learning and teaching for sustainable development

Source: Ignatius Isaac Dambudzo, 2014

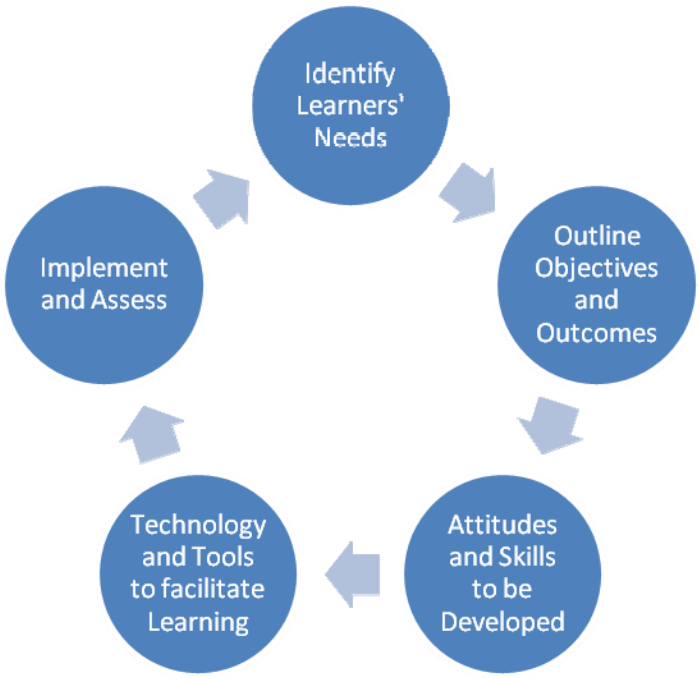

Figure 6. Instructional design for sustainable development

Source: Ignatius Isaac Dambudzo, 2014

5. Conclusions and Recommendation

Literature on the study has shown that education for sustainable development generally requires learner-centred approaches, link with the environment, teachers with technical, content, pedagogical and leadership skills. Implementation of teaching strategies could be by means of projects, problem-solving, critical thinking/enquiry and practical skills. These yielded a cadre that is creative and has entrepreneurial skills to promote development in the local and global community. Results also showed that while schools in the country had the same curriculum document to follow, implementation differed from school to school. Some were more creative, implementing the curriculum in a manner that involved integration with the environment and industry, and developing competencies for the world after school using modern technology while others focused on high achievement rates academically, knowledge acquisition and regurgitating it with very little or no industry relevant skills. The latter has been described as irrelevant for employers' needs. Teachers must therefore, plan to implement the curriculum putting emphasis on learner-centred strategies, making maximum use of modern technology, integrating academic work with industry. On their part authorities should ensure supportive education policies are in place and that curriculum is reviewed regularly to keep pace with changes in the environment and the world in general. Further research is needed to evaluate the effectiveness of implementing education for sustainable development on skills development in learners and how curriculum change or innovation can promote education for sustainable development. Challenges faced by schools trying to implement education for sustainable development can also be investigated.

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