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Views and Experiences of Gweru Rural Primary Schools Teachers on Integrating Indigenous Knowledge Systems in the Teaching and Learning of Environmental Science in Zimbabwe

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Abstract: Indigenous knowledge and Environmental Science knowledge share the same body of knowledge (environmental knowledge) yet the two systems are viewed differently. One would expect the two to complement each other since they all study environmental knowledge. This study sought to elicit views and experiences of primary school teachers of integrating indigenous knowledge in the teaching and learning of Environmental Science. The study was a descriptive survey which used questionnaires and in-depth interviews to collect data from thirty randomly sampled respondents and five participants. Document analysis was also made on syllabi and Education Acts to assess how indigenous knowledge systems are co-opted in teaching and learning of Environmental Science. Results showed that indigenous knowledge systems are not given space in formal education system which has dominated the form of education imparted to learners in Zimbabwe. Indigenous knowledge is a preserve of few people in localised areas. Many teachers have little or no knowledge of indigenous knowledge as a result; they cannot integrate it in teaching and learning. The net effect would be the extinction of indigenous knowledge systems. The study recommended that, teachers as stewards of children should have adequate and correct knowledge of indigenous knowledge and use it to explain some scientific concepts when teaching Environmental Science. Teacher training institutions should encourage trainee teachers to research on indigenous knowledge related to the subjects they pursue.
Keywords: Indigenous knowledge system, formal education, teaching and learning.

INTRODUCTION

Indigenous knowledge is knowledge that is unique to a culture or a society [1, 2]. It is sometimes called folk knowledge or peoples' knowledge. The knowledge is based on long term empirical observation of the local environment. It is the basis for a number of activities of a group of people. These include; food production, healthcare, education and agriculture. Indigenous knowledge is local, holistic, context specific and environmental. The knowledge involves environmental management and development of traditional practices which enable sustainable development. It comprises cumulative information of practices and beliefs which have been developed over centuries and have been adapted into the local culture [3]. Embedded in indigenous knowledge systems are cultural values, songs, beliefs, rituals, community laws, proverbs, local language agricultural practices, plant and animal species. People use it to preserve and protect their lives. The knowledge is naturally possessed by a particular community and its content is quite broad [4]. Indigenous knowledge is also used to make decisions in agriculture, nutrition, hunting, and health and food preparation. Colonial knowledge constructions regarded it as unscientific [5]. This was because it was misunderstood and misrepresented. Many people particularly the young regard it as outdated, lacks scientism and falls outside the scientific community.

LITERATURE REVIEW

The World Bank [6] observed that the indigenous knowledge is experiential. It is the type of knowledge which learners gain as they live and work in their communities. It forms the prior knowledge which make a foundation to build on and teach knew concepts. From it, learners get personal relevance in what they learn and acquire the ability to grasp materials taught to them when they are at school. They get sense of the world through learning and are motivated to learn when they build on prior knowledge. Besides creating prior knowledge, indigenous knowledge empowers learners to take part in the construction of new knowledge. They get exposed to contextual learning and are actively involved in knowledge creation. In the process they have ownership of the knowledge and avoid the banking concept of education [7]. Freire further argues that ownership of knowledge is equivalent to respecting of one's culture, tradition and identity.

Environmental Science is the science of relationships between man and the natural world in which he lives [8]. It looks at how the natural world works, teaches about how human beings can interact with and manage the environment and how they affect and are affected by the environment. The content is fundamentally based on the relationship between man and the environment. A close look at the body of knowledge covered in environmental science and indigenous knowledge shows that the two cover the same domain of knowledge. In both disciplines, the knowledge gained from the environment is used to solve problems and preserve the environment. The way people view the two make them appear different as cited by Mwanakatwe [9] who views indigenous knowledge as static, unchanging from one generation to another and stresses on communal and social aspects of life. The only anomaly is that locals are forced to learn environmental science in a western way. Capriccaioso [10] argues that this can frustrate academically capable native and indigenous students. They often drop out of school because their needs are not being met since they are not given opportunities to benefit from community based learning from an indigenous knowledge perspective.

Thaman [11] argues that it is possible for indigenous knowledge systems to be integrated meaningfully into western curricula. Fusion of African indigenous knowledge and modern western science is one of the best ways of alleviating African problems today. Learners are given opportunity for contextual learning. They interact with their environment and in the process; they actively take part in the creation of knowledge. This helps to reduce the gap of knowledge between what is taught in the classroom and what happens outside the classroom. What happens outside the classroom constitute the culture of the society. Lawton [12] argues the curriculum is the selection from society and it is entrusted to teachers for expert transmission to the young. The major question which one can ask is; a selection from whose culture? Nowadays the culture considered to be the most ideal culture is the culture of internationalism. This culture develops an appreciation of learning in a global context than local context. Thaman [11] asserts that education should not exclude cultural knowledge because the content of education has value underpinning of a particular culture

The increase in urbanisation today has given fewer opportunities for the young to be in contact with natural environmental knowledge [13]. Some teachers' commitment to pass on indigenous knowledge to learners depends on the degree to which they find the knowledge still useful in life. Indigenous knowledge systems are not on the radar of knowledge of modern teachers. They feel the knowledge does not fit into the new opportunities in life. Western education seems to be incompatible with indigenous knowledge for it has disrupted the practical everyday life of indigenous knowledge systems of learning. Integrating indigenous knowledge systems requires individuals who act as mnemonics on indigenous knowledge. The individuals should lead learners to educational outcomes through contextualising learning content. This entails environmental and cultural learning.

There are concerns that valuable knowledge about living sustainably will be lost as indigenous knowledge is being dislodged by western education. Leung *et al* [14] argue that indigenous knowledge does not receive much attention by western researches who find it as irrelevant to their culture. Western culture is believed to have universal trends when compared to indigenous culture which is viewed as self focused due to localised cultural orientations. There is a surge of interest in research in indigenous knowledge in Zimbabwe. The general trend is that many people prefer western culture to indigenous cultures. However, Leung [15] discovered that indigenous knowledge can be applicable to diverse cultures and has immense potential to contribute to universal theories. It can modify enrich and supplement western culture.

Shizha [16] argues that traditional knowledge can be taught as Indigenous Science. The science is linked to use of traditional languages. The language is used to name and describe local plants and traditional practices. Shizha [16] further argues that the language of instruction is a major obstacle in many schools. When English dominates science instruction, learners do not understand concepts. What is worrisome is that teachers use local languages as additive to English while teaching Environmental Science instead of explaining concepts in mother language for learners to understand. Being forced to speak English reduces the learners' ability to develop and enrich the local languages which are intertwined with indigenous knowledge. When put into practice, traditional science would entail teaching students about traditional medicine, carpentry, agriculture, blacksmith, pottery, weaving, rituals, beliefs, healing practices, ecology and plant and animal species using indigenous languages.

Aikenhead and Ogawa [17] argue that formal education programmes can be mechanisms for maintaining indigenous knowledge systems. Schools are centres where all children of school going age converge. This makes them powerful centres of arbiters of truth in society [18]. However the particularistic nature of indigenous language tends to restrict individuals to environments where the languages are usable. Maila and Loubser [17] argue that Indigenous knowledge lacks universal usage opportunities. It is localised and is used by local people to develop and

sustain their lives [20]. The knowledge is created and utilised locally and it has no potential to be used universally. This type of knowledge is embodied in peoples' culture [21].

Although indigenous knowledge and Environmental Science share the same body of knowledge, they differ in the methodology of teaching the knowledge. Oli and Dhakal [22] argues that indigenous knowledge is transmitted through intergenerational learning chain in which it is orally passed on from one generation to another. The knowledge is acquired over a lengthy period in a traditional context when compared to modern scientific knowledge [23]. Indigenous knowledge enhances holistic learning and teaching based on interactive and connectedness understanding of the universe and everything that is found in it [24]. It is experiential and can be practically tested. With western science learners spend most of their time learning passively in classroom and laboratories rather engaging in hands-on experiences *in situ*. They learn about ecological interdependence, conservation practices and resources management [25]. Indigenous knowledge is also transmitted to the younger generation through informal education, word of mouth and cultural rituals [1].

STATEMENT OF THE PROBLEM

There has been an outcry that indigenous knowledge is left out in favour of the modern western knowledge despite being quite useful. Environmental Science and Indigenous Knowledge focus on the same body of knowledge yet the later is dismissed and regarded as obsolete [2]. Can indigenous knowledge be assimilated into modern scientific and technological knowledge in order to dispel the belief that western knowledge is the only worthwhile knowledge? The Zimbabwean education system has a role to pass on the indigenous knowledge systems to the next generations but observation shows that it is not given space in the teaching and learning of Environmental Science. This study sought to explore the views and experiences of primary school teachers on the possibilities of integrating indigenous knowledge systems in teaching and learning of Environmental Science.

OBJECTIVES

The study was guided by the following objectives;

1. To explore teachers views on whether or not indigenous knowledge and Environmental Science a share the same domains of knowledge.
2. To explore teachers perceptions of integrating indigenous knowledge systems in teaching and learning of Environmental Science.
3. To establish factors which militate against integration of indigenous knowledge system in teaching and learning of Environmental Science?

RESEARCH QUESTIONS

The study was guided by the following questions:

1. Do indigenous knowledge and Environmental Science share the same body of knowledge?
2. Can teachers integrate indigenous knowledge in teaching and learning of Environmental Science?
3. What are the factors which militate against integration of indigenous knowledge systems in teaching and learning of Environmental Science?

SIGNIFICANCE OF THE STUDY

Acquisition of indigenous knowledge is inextricably intertwined with learning of the environment which in western education is congruent to environmental science. The two can complement each other to ensure successful teaching and learning of Environmental Science. The study of teachers' views on the integration of indigenous knowledge system in teaching and learning of Environmental Science helps to locate the gaps which undermine the integration of the two. The study helps to identify opportunities for relevant integration of the two in the teaching and learning of Environmental Science. Since culture is embedded in indigenous knowledge, the study awakens the need for culturally relevant and responsive teaching. The study enhances the need to teach pupils from the perspective of various cultures. It brings to light the need to have traditional and contextual way of teaching the subject and relate it to the current scientific approach to teaching. The importance of indigenous knowledge as an important reservoir of knowledge which can be harnessed to enhance the learning of Environmental Science can also be highlighted by the study.

METHODOLOGY

The study was a descriptive survey in which qualitative and quantitative data gathering techniques were used to collect data on teachers' views and challenges of integration indigenous knowledge in teaching. The participants of the study were drawn from cluster ten rural primary schools with a population of one hundred and twenty (120) teachers. The rural setting was chosen because rural areas have high concentration of indigenous knowledge systems and practices. Thirty (30) randomly sampled teachers responded to questionnaires which consisted of both open ended questions and closed questions. Random sampling reduced the chance of biased research [26]. Five (5) Heads of primary schools were interviewed to elicit information on their views on integrating indigenous knowledge system in the teaching of Environmental Science. The purpose of interviews was

to produce qualitative data and provide insights into the attitudes, perceptions and opinions of the participants [27]. Document analysis was also used to collect data on how indigenous knowledge is taken on board in Environmental Science syllabus. Zimbabwean Education Acts were also analysed with regards to their position on the use of indigenous languages as vehicles of passing on indigenous knowledge systems to children. The syllabuses and textbooks which are the source documents for teaching Environmental Science were also analysed to assess the extent to which they take on board the teaching and learning of indigenous knowledge.

FINDINGS

Teachers views on integrating indigenous knowledge

Responses from the questionnaires showed that it was difficult to integrate indigenous knowledge systems in teaching Environmental Science. All (100%) the respondents indicated that it is difficult to integrate indigenous knowledge because the syllabus does not take on board indigenous knowledge issues. Interviewed heads of schools also confirmed this view as reflected by the following remarks

"We have to teach within the dictates of national syllabi. Indigenous knowledge is not incorporate in the Environmental Science syllabus"

"We teach what is examinable. Indigenous knowledge is rarely examined in the ES examination"

Noteworthy from the remarks was the fact that indigenous knowledge is not given space in the teaching of Environmental Science. As a result teachers are forced to concentrate on content which is in the syllabus. It is an offence to teach content which is not in the syllabus. Although there is high concentration of indigenous knowledge in rural area, learners are not given opportunity to learn it. Children are taught the western culture from an early age. The major challenge is that indigenous knowledge is localised, contextual and peculiar to a group of people while western science claims universality, transferability and its institutionalisation confers it to be an object that can be essentialized [28]. Indigenous knowledge is regarded as residual, backward and traditional way of life and many young people and modern teachers do not want to be associated with it. Furthermore, it is not part of the syllabus.

One school head however supported the idea of using indigenous knowledge in teaching Environmental Science and confirmed that the two cover the same domain of knowledge and can complement each other. He gave the following example:

"The topic pressure can be explained through some traditional winnowing practices. In the Shona culture, when farmers want to winnow small grains and there is no wind to facilitate the winnowing process, the farmers make fire. After some time winds start blowing and they winnow their grains. Fire creates a low pressure area. Winds move from high pressure (cold) to low pressure (hot) area. The fire attracts the winds to come to low pressure area thereby facilitating the winnowing process."

The remarks by the school head indicated that indigenous knowledge and western knowledge can complement each other. It is possible to make learners understand scientific concepts using indigenous knowledge explanation. The fire creates a low pressure area which would attract winds from (cold) high pressure area which facilitates winnowing process. This indigenous knowledge can successfully and effectively be used to teach the topic 'Pressure'.

Table 1: Teachers views on whether Indigenous knowledge and Environmental Science share the same body of knowledge N = 30

	Yes	Percentage	No	Percentage	Total
They share same body of knowledge	14	47%	16	53%	100%
They can be taught using the same methods	25	83%	5	17%	100%

The results show that there are mixed feelings on whether indigenous knowledge and environmental share the same body of knowledge. Forty-seven (47%) indicated that the two do not share the same body of knowledge. These could be the teachers who had been acculturated in the western life and indigenous knowledge has not been in their radar of experience. As a result, they cannot be cultural broker science teachers who can assist learners to move back and forth between the indigenous culture and western science and help them deal with cultural conflicts that may arise [29]. Fifty-three (53%) indicated that they share the same body of knowledge. These could be the teachers who could have had exposure of indigenous life and are aware that the two share the same body of knowledge. Majority of the teachers (83%) indicated that the two cannot be taught using the same methods. This could be the reason why indigenous cannot be integrated in the

teaching of Environmental Science even if the two study the same body of knowledge.

The graph below shows a reflection of teachers' knowledge of indigenous knowledge.

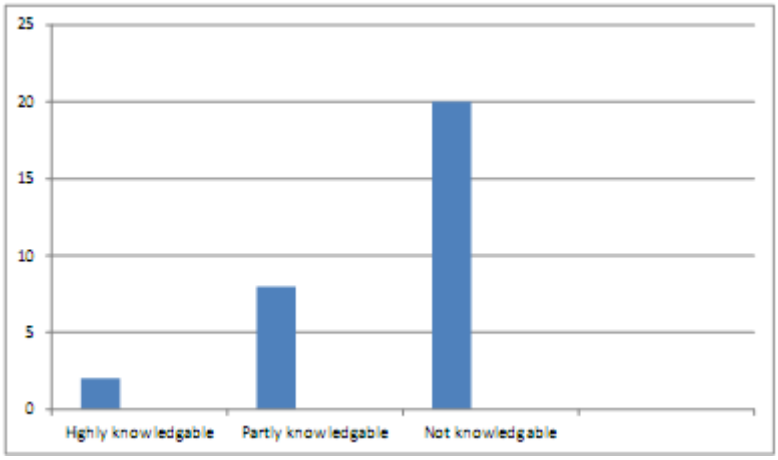

Fig-1: Teachers' knowledge of indigenous knowledge N=30

The graph shows that the majority of the teachers sixty–seven (67%) indicated that they did not have knowledge of indigenous knowledge. Teachers' knowledge of indigenous knowledge plays a fundamental role in the successful transmission of indigenous knowledge to learners. Shulman [30] argues that teachers need to understand subject matter deeply and flexibly so that they can be able to help student to create cognitive maps, address misconception and relate one idea to another. The lack of knowledge is a major militating factor against integration of IK in teaching Environmental Science. Most teachers have been socialised in the western culture and are not conversant with indigenous knowledge as remarked by one of the interviewed school heads:

Western culture is "The" culture for modern life. This is stressed by its dominance in curriculum. Everyone aspires to live the western way.

The remarks from the interview show that the school curriculum is dominated by content from the western culture which teachers are forced to focus on because it is the one which most people aspire to have. It is the same culture which learners are examined on. Furthermore, the schools system are geared towards passing national examinations and teachers put their thrust towards that which is examinable than non-examinable matter. At every level, learners are being prepared for examinations and the examinations do not test indigenous science, and content. The fact that the Ministry of Primary and Secondary Education emphasises on passing the examination and covering the syllabuses make teachers give their back to indigenous knowledge. Some teachers have no taste and interest in it.

Factors which militate against teaching of integration of indigenous knowledge

The study showed that besides lack of knowledge, there other factors which affect integration of indigenous knowledge in teaching and learning of Environmental Science. Most teachers have negative attitudes towards indigenous knowledge as reflected by the following remarks.

Indigenous knowledge restricts people to a localised environment and cannot be used internationally. It's of no use teaching it. The purpose of modern education is to prepare individuals to live in the global village.

Noteworthy from the remarks is that integration of indigenous knowledge does not prepare individuals to fit in a global world. Shizha [16] argues that teachers have been schooled for global educational needs than localised needs. Most of them want to use English for international recognition. For this reason, they also want to prepare learners for the global world than localised environment

The Zimbabwean Education Act of 1987 also has a role to play in glorifying western culture at the expense indigenous knowledge. The policy and syllabus bear little resemblance to students' real cultures [25]. The act states that all subjects including indigenous languages are to be taught in English. This has forced teachers to focus more on English cultural symbols and language and these have dominated the way people communicate at the expense of indigenous language. The syllabi for indigenous languages for the newly unveiled curriculum are written in English. Indigenous knowledge can best be taught using indigenous language. Analysis of the syllabuses which are the source document used by the teachers show that no

space is given to the teaching of indigenous knowledge in Environmental Science. Notable was the fact that all subjects except indigenous languages are taught in English.

DISCUSSION

While there can be an outcry for the need to integrate indigenous knowledge systems in teaching and learning of Environmental Science, harmonisation of indigenous cultures in the Environmental Science syllabus is also a challenge. Regions can be made up of learners from different indigenous groups. Major questions which can arise are; whose indigenous knowledge should be taught? Do the teachers have knowledge of the different indigenous knowledge systems? How can the different indigenous knowledge systems be taught to different classes or groups class? In view of the different indigenous knowledge systems is it possible to have one national Environmental Science syllabus. This poses a big challenge to curriculum designers and teachers. Eventually they find the teaching of western science as the standard knowledge to be taught to all learners. This has led to the atrophy of indigenous knowledge in Zimbabwean education system.

Dziva *et al* [25] argue that in Zimbabwe, little effort has been made to bring indigenous language and knowledge in the classroom and to take learning back to the community. No focus is made integrate to indigenous knowledge when teaching Environmental Science in schools. Emeagwali, 2003 argues that a science curriculum that is responsive to indigenous knowledge enables sustainable development, environmental responsibility and cultural survival. Curriculum designers should take on board indigenous knowledge when designing curriculum. This gives rise to the following questions; who designs the curriculum? Which culture is supported by curriculum designers? Culture determines the content to be taught in the subject and the method of teaching the subject.

One of other major challenges of teaching indigenous knowledge is the burden of parallel socialisation of the rural children. This is when children are forced to learn the home culture (which comprise of IK) and the school culture (comprising of western culture). Of the two cultures, the school culture is examined, taught formally and is considered as the *gate skills* for entry into universal life. As a result it is given much emphasis by teachers. Parents aspire their children to acquire this type of knowledge. Teachers, who teach the culture and are representatives of the western culture, find it difficult to transmit indigenous culture. For the learners from rural areas, the burden of learning two cultures account for their poor performance when compared to children from the ruling class whose culture constitute the content of the school curriculum. Observation shows that the syllabuses used do not give space to the learning of indigenous knowledge which they are familiar to.

The success of transmitting indigenous knowledge hinges on the availability of teachers who have knowledge and know how to transmit it. Results showed that many teachers do not have knowledge of and taste of indigenous knowledge. This is a major militating factor against integration of indigenous knowledge in teaching. There is need for teachers to have components of indigenous knowledge which they impart to the learners. Furthermore, teachers devalue indigenous experience as a way of knowing and understanding. In the process, they prevent learners to benefit from culturally inclusive and relevant science. Students in Zimbabwe and Africa need locally constructed and applicable knowledge which mirrors their social and cultural consciousness than is the case now [25]. It is therefore important for teachers have a positive attitude towards indigenous knowledge.

CONCLUSION

Environmental Science and indigenous knowledge should not be seen as adversaries. They should be viewed as complementary to each other. The two share the same body of knowledge. Learners can benefit immensely if they are integrated. They can be empowered to understand knowledge from both indigenous and western perspectives. Their complimentary nature plays an important role in the teaching and learning of Environmental Science. If the two are integrated, the power struggle between them can be reduced.

RECOMMENDATIONS

The study makes the following recommendation**;**

- Teaching and learning activities should involve exposing learners to quality natural environment so that they have a lived experience of some indigenous knowledge. When learners observe and with assistance of resource persons they can be able to understand nature.
- Teachers, as stewards of children during their learning life, should have adequate and correct knowledge of indigenous knowledge so that they can be able to cascade it to learners.
- The Ministry of Education should consider introducing traditional science in schools as a way of encouraging the learning of indigenous knowledge. Traditional leaders should be *incorporated* in the teaching of indigenous knowledge.
- An indigenous knowledge responsive science curriculum should be designed so that learners are

given opportunity to understand subject matter within their environment.

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