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Teachers' Perceptions on Inclusion of Agricultural Indigenous Knowledge Systems in Crop Production: A Case Study of Zimbabwe's Ordinary Level Agriculture Syllabus (5035)

Constantino Pedzisai
Chinhoyi University of Technology, Institute of Lifelong Learning, Department of Curriculum and Instruction, Private Bag 7724, Chinhoyi, Zimbabwe
E-mail of the corresponding author: pedzisaic@gmail.com

Abstract
The study sought to establish perceptions of Ordinary Level Agriculture teachers on the inclusion of Agricultural Indigenous Knowledge Systems (AIKS) in the Crop Production Section of Zimbabwe's Ordinary level Agriculture Syllabus (5035). Absence of local content in the syllabus, yet indigenous farming practices have stood the test of time, motivated the study. The study employed the descriptive survey research design which used structured questionnaire and a Focus Group Discussion as research instruments. Stratified random sampling was used to select 50 Agriculture teacher respondents. The study established that the respondents were aware of, Agriculture Indigenous Knowledge Systems, but unofficially utilising them in the teaching of the subject. Respondents agreed that the inclusion of AIKS in the syllabus would foster sustainable development and enable agriculture to reclaim, revitalize and renew its cultural identity denigrated through colonization. However AIKS inclusion was found to face challenges chief among which were its current reliance on oral tradition and the inferiority complex it suffers to Western agricultural practices. The study recommends that AIKS be harmonised with Western agricultural practices in the curriculum as complementary cosmologies and that more research be carried out to document AIKS literature.
Keywords: Indigenous knowledge systems, Curriculum, Postcolonial theory, Agriculture, Western agricultural practices, Colonisation, Harmonise.

1. Introduction

While indigenous Africans had their own sustainable agricultural practices before colonization the school agriculture curriculum still remains Eurocentric in nature. A clear cut policy on Indigenous Knowledge Systems (IKS) for Zimbabwe is long overdue compared to other African countries. In support, Matowanyika, Garibaldi and Musimwa (1995) posit that Africa scorns itself and fails to recognize the advanced nature of its own achievements in indigenous knowledge.

The agricultural practices which indigenous Africans had known and practiced for generations before colonialism, though marginalised during colonialism, still continue to be practiced (Melchias, 2001 in Eyong, 2007). These indigenous agricultural and land use practices are based on generations of experience, informed experiments and intimated understanding of the indigenous people's biophysical and social environments (Mapara, 2009). There is, however, absence of IKS content in the Crop production section of the Agriculture syllabus (5035). While both the community and schools in Zimbabwe uphold some IKS concepts in Agriculture, candidates' Agricultural indigenous knowledge systems (AIKS) based answers are rejected in the national examinations.

Corollary, curriculum should recognize the richness of IKS and their contribution to transforming and instilling pride in the learners by identifying the relevant components of IKS that can be included in the science curriculum (Jegede and Aikenhead, 1999; Maluleka, Wilkinson, and Gumbo, 2006) to include Agriculture (Williams and Muchena, 1991).

2. Contextual Analysis

The research hinges on the indigenous knowledge systems paradigm as informed by the postcolonial theory of knowledge reconstruction. Postcolonial theory is a philosophy which emphasises the power of indigenous knowledge as the conduit for competitive scientific advantage.

Historically, the colonial era disregarded the existing social, political and cultural native ways of life and acculturated the natives (Mapara, 2009). Africans accepted the self- ascribed superiority of this alien culture. Postcolonial theory challenges the formerly colonised to reclaim their lost intellectual, social, political, economic, and linguistic cultural values in order to reconstruct a body of knowledge from their indigenous knowledge reservoir (Woolman, 2001; Sutcliffe, 2011). The theory challenges indigenous peoples to speak for themselves, in their own voices, for a return to some of their cultural knowledge.

The fact that the West are coming in with the same AIKS based practices but renaming them 'new technologies'

shows the value of AIKS. Ogunniyi, (1997)'s Contiguity Argumentation Theory propounds that IKS and mainstream science are considered as equipollent or complimentary cosmologies. Hence both need harmonization in the school Agriculture curriculum. However, in the Zimbabwe 'O' Agriculture syllabus (5035), in general, and crop production section of the syllabus, in particular, western agricultural practices, which are based on euroscience, claim outright superiority over AIKS.

This study therefore sought to explore perceptions of 'O' level Agriculture's teachers towards the inclusion of Indigenous Knowledge Systems (IKS) in the Crop Production section of Zimbabwe's Agriculture syllabus (5035).

3. Statement of the Problem

The current Zimbabwe secondary school Agriculture syllabus (5035) lacks indigenous content. The syllabus is composed of western agricultural practices due to denigration of agricultural indigenous knowledge systems (AIKS) by colonisation. The fact that Agriculture is an applied science means that mainstream science therefore claims entire superiority over IKS in the syllabus. Yet, as stated earlier on, the two knowledge systems; western science and IKS, are regarded as complimentary cosmologies in need of a dialogue that would result in meaningful learning (Ogunniyi, 2007). After all before colonisation, indigenous Africans had their own farming practices which have stood the test of time (Mapara, 2009, Emeagwali, 2003 and Matowanyika, 1999). The author's experience as an Agriculture teacher-cum-examiner of the Zimbabwe Agriculture Syllabus (5035) has witnessed an unpalatable situation whereby some IKS related answers are rejected in the public examinations. Such presence of AIKS based answers in public examination is a clear revelation that Agriculture teachers include some AIKS concepts in their teaching although these are not in the syllabus. Such a scenario is a far cry for the inclusion of these AIKS concepts in the syllabus in question. This study focused on the perceptions of agriculture teachers on inclusion of AIKS in the crop production section of the Zimbabwe 'O' level Agriculture syllabus (5035).

4. Research Questions

- Are Agriculture teachers aware of AIKS pertaining to the Crop Production section of the 'O' level Agriculture Syllabus (5035)?
- What do Agriculture teachers view as the wisdom of infusing AIKS into the Crop Production section of the syllabus?
- What challenges would schools face when integrating AIK into the syllabus?

5. Significance of the Study

Infusing AIKS in the school agriculture curriculum would enable indigenous Zimbabweans reclaim, revitalize and renew their cultural identity denigrated, marginalized, despised or destroyed by colonialism (Hammersmith, 2007). That way unhealthy imbalances, distortion, trivialization and neglect as inflicted by Eurocentric education and governance would be uncovered.

The practice of infusing AIKS into the Agriculture syllabus is a way of empowering the indigenous people through the learners, the future generation, since IKS is a resource that provides a firm foundation of sustainable and environmentally sound approaches to agriculture. Emeagwali (2003) observes that IKS is cost effective, relevant, and indispensable environmentally and ecologically. It should therefore be noted that the basic component of any country's knowledge system is its indigenous knowledge. IKS encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood (World Bank, 1998).

Inclusion of Agricultural IKS's in the school agriculture curriculum would give learners recognition of prior, homegrown, and local knowledge and experiences that yield intrinsic motivation, critical thinking, independent decision making, cultural empowerment and meaningful learning. Starting with the familiar agricultural practices the teaching/ learning process would progress from the familiar (IKS) to the unfamiliar (western), from the concrete to the abstract. Lemke (2001) underscores that student learning depends on community beliefs, acceptable identities, and the consequences for a student's life inside and outside the classroom.

The findings of the research may be a basis for further research in agricultural IKS and for Zimbabwe and those African countries which have not yet included IKS in their school curricula to map out their IKS policies. Further research would be one way of documenting the invaluable IKS in order to foster its growth.

6. Literature Review

Indigenous knowledge systems refers to the sum total of local belief systems, knowledge and skills possessed by an individual community accumulated over generations of living in a particular environment (Behera and Nath, 2000; Turner, Ignance and Ignance, 2000). Despite the fact that indigenous Africans had their own sustainable agricultural practices before colonization (Mutandwa and Gadzirayi, 2007; Mapara, 2009) western agricultural

practices still dominate the school agriculture curriculum in Zimbabwe.

Du Toit, (2005) posits that IKS is holistic and dynamic, yet a stable knowledge stored in social memory. It is a part of the physical and social environments, emphasizes locality and is of value to the community (Reid, Berkes, Wilbanks and Capistrano, 2006). IKS is community rather than individual knowledge, unique to every culture or society and providing problem solving strategies for that society. It is the basis for local level decision making in agriculture, health care, food preparation, education, natural resource management (Horak, 2005).

Both IKS and Euroscience are a basic part of human experience (Matthews, 1998). They are both sciences. Euroscience is referred to as mainstream science and IKS ethnoscience or simply a people's science. Ogunniyi (2007) argues that there is science in IKS. Alebiosu (2006) suggests that the science in IKS arises from questions about the interactions between people, their environment and the metaphysical world. Mutandwa and Gadzirayi (2007) acknowledge the existence of science in IKS as strongly bonded in agriculture. Since IKS's science component is relevant for inclusion in the school agriculture curriculum there is need to identify it before planning for the innovation.

Ogunniyi (2007) and Emeagwali (2003) hold the same view that intersection between IKS and mainstream science exists. For both the experiment is the environment. Western science itself is an indigenous system, rooted in western philosophies and culture (Kyle, 1999). The argument explicates the relationship between IKS and euroscience in the classroom as that between alternative forms of indigenous knowledge developed in different cultural traditions. Ogunniyi (1997)'s Contiguity Argumentation Theory propounds that the two worldviews, IKS and mainstream science are considered as equipollent or complimentary (Vandeleur and Schäfer 2011; Ogunniyi, 2007) hence they can be harmonised in the secondary school agriculture curriculum.

Inclusion of IKS reflects the values and wisdom of indigenous Zimbabweans acquired over centuries but lost during colonialism (Mutandwa and Gadzirayi, 2007). Against that background, incorporating agricultural AIKS in the school agriculture curriculum could be one way of rediscovering, documenting and reexamining the often orally transmitted IKS. In addition, the emerging IKS would, after formal way of recording them, also require inclusion.

Lack of Zimbabwe's clear cut policy on IKS compared to other African countries, the broad and undocumented nature of IKS, the inferiority complex of IKS and Zimbabwe's multi-ethnicity are some of its implementation challenges (Matowanyika, 1999).

Inclusion of IKS in the curriculum is propelled by an incorporationist approach that brings IKS into mainstream science by seeking how best IKS fits into science; a separatist approach that holds IKS side-by-side with scientific knowledge; and an integrationist approach that links and makes connections between IKS and science (Naidoo, 2010).

7. Methods

This study employed the descriptive survey research design. Stratified random sampling was used to select five respondents from each of the ten Education Provinces. The sample thus consisted of fifty (50) 'O' level Agriculture teachers, 26 males and 24 females, selected from a target population of 130 Agriculture teachers-cum-examiners who were visited at the December 2012 'O' level marking venue. Of these 3 per province completed the questionnaire while 2 per province participated in the Focus Group Discussion (FGD). The instruments had been pilot- tested on Chinhoyi University of Technology in-service Bachelor of Technology Education students, specializing in Agriculture. Comments raised from the pilot test were used to rid the final documents of any ambiguities thereby ensuring validity and reliability of the instruments. Permission to carry out research was granted by the Zimbabwe School Examinations Council (ZIMSEC) and the Zimbabwe Ministry of Education, Sport, Arts and Culture. Quantitative data from close-ended questions were analysed using, frequency tables and percentages to determine the general opinion of the respondents towards given variables. Qualitative data were interpreted thematically by evaluative description of common themes and patterns permeating the main issues under interrogation. Data analysis procedure therefore ensured methodological triangulation.

8. Results and Discussion

8.1 Agriculture teachers awareness of AIKS pertaining to the Crop Production section of the 'O' level Agriculture Syllabus (5035)

The respondents were first asked to indicate the extent to which they agreed that their subject Agriculture had lots of African indigenous knowledge. The results are represented in Table 1 below.

Table 1: The extent to which the respondents agreed that their teaching subject Agriculture had lots of African Indigenous Knowledge

(N=30)

Response	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Total
f	10	17	2	1	0	30
%	33.3	56.7	6.7	3.3	0	100

Of the 30 teacher who responded to the questionnaire, 33.3% (n=10) strongly agreed and 56.7% (n=17) agreed that the subject Agriculture had lots of IKS. This represented 90% (n=10+17=27) of the respondents. The rest had 3.3% (n=1) disagreeing and 6.7% (n=2) not sure that Agriculture had lots of AIK. However and surprisingly, those 3 respondents went on to respond to all the other sections of the questionnaire wherein they gave examples of AIKS concepts they were already utilising in the Crop Production section of the syllabus. Findings from the FGD concurred with those of the questionnaires. All this showed that all the respondents agreed that there was AIKS in the discipline Agriculture. The Agriculture teachers responses agree with those of Mapara (2009), Williams and Muchena (1991), Matowanyika (1995, 1997) and World Bank (1998) all who declare that Agriculture has lots of indigenous knowledge.

Table 2: Respondents indications Of AIKS in the Crop Production Section of the 'O' Level Agriculture Syllabus (5035)

(N=30)

Response	f	%
Post- harvest technology; seed preservation in storage using wood ash, sweet potato storage in pits (murindi)	28	93.3
Growing traditional drought, pest and disease tolerant crop cultivars	23	76.7
Crop pest control	18	60
Addition of crop nutrients using anthill, ash and humus.	15	50
Land preparation; winter- ploughing, zero tillage	11	36.7
Planting in vleis	10	33.3
Growing traditional drought, pest and disease tolerant crop cultivars	10	33.3
Determining soil fertility using inhabitant tree species.	9	30
Planting systems; soaking seed in water before planting to bring forward germination date, dry planting. Moisture planting	9	30
Cropping systems; mixed cropping, multiple cropping	8	26.7
Seed treatment; smoking on kitchen line against weevils	7	23.3
Seed selection; seed of open- pollinated varieties from previous harvest	5	16.7

Post- harvest technology (n=28; 93.3%) was the commonest practice by growing of traditional drought, pest and disease tolerant crop varieties (n= 23; 76.6%).The least identified was seed selection techniques (n=5; 16.7%) followed by soil treatment methods (n=7; 23.3%).

The results are in agreement with Sibanda (1998) who, in his research, concluded that AIKS were still sustaining local people in crop farming including- land preparation, grain selection, planting and harvesting as well as grain storage. For instance, the post- harvest storage technology mentioned by the respondents included such concepts like preservation of seed in storage using wood ash, gum tree leaves and kitchen smoke. Three of the respondents made mention of the fact that probably there is a chemical substance in wood ash and wood smoke which needed modern laboratory experiments to determine. Chota et al, (2010); and McClean et al, (2005) opine that all IKS related agriculture practices which have something to do with plant and animal production should be protected and continue to be used since they have a lot of advantages over the Western practices.

The FGD yielded that, in Zimbabwe, there is a general tendency to control crop pests like maize stalk-borer using tobacco snuff, weevils using gum tree leaves, millet chaff and wood ash of Mutsviri tree (Combretum imberbe); Zumbani (Lippia javanica), bitter apple (Solanum incanum) and shallots are also sprayed to repel aphids. Burning and grinding pests then spraying them can make them act as repellents for their counterparts. Scare- crows can also be erected in groundnut and monkey-nut fields to scare away animal pests. Seed selection techniques were found to be so common among indigenous people. Madebwe et al (2005) note that marginalisation of IKS has resulted in rapid loss of traditional seed varieties best suited to the prevailing agro-economic conditions. It has also led to the cultivation of unsuitable crops for marginal farming areas

8.2 The wisdom of infusing AIKS into the Crop Production section of the 'O' level Agriculture Syllabus (5035)

Table 3: The Wisdom of Incorporating AIKS in the Crop Production Section of the 'O' Level Agriculture Syllabus (5035)

(N=30)

Merit	f	%
Cheap local knowledge and inputs; even the poor can afford	24	80
Use of readily and locally available resources	21	70
Environmentally friendly; Non- toxic since no chemicals are used, non- pollutant	18	60
Easy to use/ user friendly	16	53.3
AIKS is effective	13	43.3
AIKS gives people their cultural identity	10	33.3
AIKS brings old proven principles into the new world of agriculture	9	30
Widens/ enriches students' knowledge of agriculture	8	26.7
Not foreign; home grown hence pass rate may improve	8	26.7
Will give it opportunity to be recorded so as to pass it on to the new generation	5	16.7

From Table 3 above the idea that IKS provides cheap, local knowledge and inputs (n==24; 80% was viewed as the commonest merit of including IKS in the Crop Production section of the syllabus. One FGD respondent opined that 'Even the poor can afford thereby reducing overdependence on instituted and borrowed knowledge'. This was closely followed by and related to that it uses readily and locally available resources (n= 21; 70%). Pertaining to its environmental friendliness FGD respondents advanced that IKS do not use toxic pesticides which would cause environmental pollution and other side effects of chemical use (n=18; 60%). The least popular merit was that incorporating AIKS in the syllabus would give IKS the opportunity to be recorded so as to pass it on to the new generation (n=5: 16.7%).

8.3 AIKS concepts Agriculture teachers were already, but unofficially utilising in their teaching of the syllabus

Agriculture teachers made revelations of AIKS concepts agriculture teachers were already, but informally, utilising when teaching the crop production section of the Agriculture syllabus 5035.

Planting techniques (n=26; 86.7%) included such practices like pot holing, dry planting, zero tillage and minimum tillage. They applied organic matter, anthill soil and wood ash (n=22; 73.3%) to add nutrients to the soil. The teachers controlled crop pests (n=22; 73.3%) with crashed leaves of Mukuvazviyo/ Mushozhowa tree (Psudalachnostylis Maprouniflolia) against termites and sprayed leaves of muchacha, gum tree, Zumbani (Lippia javanica) and Mexican marigold (Tegetes minuta) as aphid repellents. Stored cereals were mixed with millet chaff, ash of Mutsviri (Combretum imberbe) and gum tree ash (n=22; 73.3%). They also used some herbs to treat animal ailments of their domestic animals (n=17; 56.7%). For instance Chisvosve tree (Adenium obesum) and dried, ground gecko for opthalmia, drenching cattle with home brewed beer for babesiosis, dressing wounds with Muvengahonye tree (Clausena anisata), giving cows Mutohwe (Azanza garckeana) leaves for removing the after birth in the same way as uterine pessaries do and drenching animals with Rusungwe (Euphorbia tirucalli) or salted soot for diarrhoea. Teachers who were operating in low rainfall areas grew small grain crops in low rainfall areas (n=6; 20%). Madebwe et al (2005) notes that marginalization of IKS has resulted in rapid loss of traditional seed varieties best suited to the prevailing agro-economic conditions. It has also led to the cultivation of unsuitable crops for marginal farming areas.

These indications by the Agriculture teachers are summarised by Chota et al (2010) who observe that all AIKS which have something to do with plant and animal production practices should not only be protected but continue to be used since they have a lot of advantages over the western practices.

8.4 Envisaged challenges of including AIKS in the Crop Production section of the Agriculture syllabus (5035)

The responses in Table 4 below agreed with those of the interviews. The commonest challenge was lack of documented literature on IKS (n=25; 83.3%) followed by that the elderly tend to be so secretive about IKS (n==19; 63.3%). The idea that the syllabus was already too long to complete (n=1; 3.3%) proved to be the least challenge. Worth mentioning is the idea that some AIKS concepts are metaphysical, spiritual and unscientific (n=13; 43.3%). Ogunniyi (1986) refutes this when he says that a great number of African myths and beliefs have scientific explanations which cannot be ignored. The negative attitudinal view of some teachers' towards AIKS that it suffers inferiority complex due to euro-centrism (n=11; 335.7%) is also amplified by Sibanda, (1998). He observes that many young people may view AIKS as being obsolete and out of date when compared with Western agricultural practices.

Table 4: Challenges Schools Would Face when Integrating AIKS into the Crop Production Section of the 'O' Level Agriculture Syllabus (5035)

(N=30)

Challenges	f	%
Lack of documented literature on AIKS	25	83.3
The elderly treat it as sacred hence restrictive in passing on	19	63.3
Some AIKS concepts are metaphysical/ spiritual hence unscientific	13	43.3
Negative attitude; suffers inferiority complex due to euro-centricism	11	35.7
Not standardised; varies with geographical location	8	26.7
Not standardised; measurements, quantities	3	10
Language diversity a barrier	2	6.7
Syllabus already too long to complete	1	3.3

Reid et al., (2004) reiterate that indigenous knowledge goes hand in hand with old age; the loss of the accumulated knowledge through death hinders the perpetuation and passing on of the knowledge from generation to generation. Such sentiments warrant the inclusion of AIKS in the syllabus to maintain cultural identity.

9. Conclusions

AIKS were still sustaining local people in crop farming including- land preparation, grain selection, planting, and harvesting as well as grain storage. 'O' level Agriculture teachers were aware of AIKS some of which they were already utilizing informally in the teaching of not only the Crop Production section of the Agriculture syllabus 5035, but the entire syllabus. Inclusion of AIKS in the syllabus would foster sustainable development and enable agriculture to reclaim, revitalize and renew its lost cultural identity denigrated by colonization. The move would widen and enrich students' knowledge of Agriculture thereby improving pass rate in the subject. The practice would also offer opportunities for further research in AIKS. However AIKS inclusion in the section of the syllabus in question was bound to face challenges chief among which were its current reliance on oral tradition, that it is not standardized and the inferiority complex it suffers to Western agricultural practices.

10. Recommendations

The study recommends that AIKS should be harmonised with Western agricultural practices not only in the Crop Production section of the 'O' level Agriculture syllabus 5035, but the entire syllabus. To effect that Zimbabwe should, as a matter of urgency, implement its IKS policy in education as has happened with other African countries. There is also need for more research to be carried out to document AIKS literature. Awareness campaigns that target the young generation need to be mounted in order to conscientise them on the importance of AIKS.

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Author

Constantino Pedzisai obtained his B.Ed. in Agriculture Education, with Curriculum Studies as the professional option, and M. Ed. in Curriculum Studies from the University of Zimbabwe. Currently, he is a lecturer in the Department of Curriculum and Instruction at Chinhoyi University of Technology, Zimbabwe. He also has several years' experience as high school teacher, high school head, and lecturer in teacher training colleges in Zimbabwe. His research interests are in Curriculum and Instruction, Agricultural education, Indigenous Knowledge Systems and Technical/Vocational education.