# UTILIZING INDIGENOUS KNOWLEDGE SYSTEMS IN AGRICULTURAL EDUCATION TO PROMOTE SUSTAINABLE AGRICULTURE

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Indigenous knowledge systems (IKS) are being examined by academicians, development planners, and contributors to alternative development approaches (World Bank, 1989). Sustainable agriculture and environmental management are among the issues featured in the IKS literature. These issues, however, have not received much attention from the discipline of agricultural education.

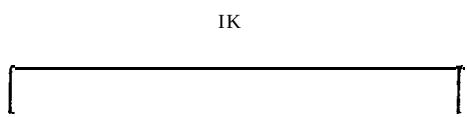
The purpose of this paper is to develop a theoretical framework for utilizing IKS in nonformal agricultural education to promote sustainable agriculture. What is indigenous knowledge (IK)? What special contribution can it make to sustainable agriculture? How can this contribution be incorporated into agricultural education ? From a review of the IK literature, important conceptual, philosophical, and technical issues emerge in answer to these questions. Conceptual issues refer to definitions and dimensions of IKS. Philosophical issues refer to the perception of and justification for IK in sustainable agriculture. Technical issues relate to the modalities of implementing IK's contribution through agricultural education.

The theses of this paper are:

1. Understanding (cognitive domain) and appreciation (affective domain) of IKS are essential for promoting sustainable agriculture development.
2. Indigenous knowledge systems provide for nonformal agricultural education programs a cultural basis absent or glossed over in technology transfer approaches.
3. The implications of IKS to agricultural education should be addressed in a systematic curriculum approach.

## Definitions of IKS

As an emergent field of study, IK is characterized by various definitions, fragmented theoretical conceptions, and marginalized positions vis-a-vis the current mainstream knowledge system. Thus, a plethora of terminologies referring to the same phenomenon has resulted: indigenous knowledge systems, indigenous technical knowledge, ethnoscience, local science, traditional science, people's science, and village science (Atte, 1989). These terms tend to have negative connotations such as static, conservative, or backward. As illustrated in Figure 1, it is necessary to distinguish the semantic definitions from the conceptualization of the phenomenon.




| semantic definitions | conceptualization of IKS |
|---|---|
| -originated and produced, growing, living, or occurring naturally in a particular region or environment | -integrated system of cognition, beliefs/values, and practices |
| -"native" (Webster's Ninth Collegiate Dictionary) | -contextual information system |
| -associative meanings: simple, tribal, backward; traditional, static, exotic, inferior | -comprehensive in dimensions of application |

Figure 1. Definitions of IKS

Both semantic and conceptual aspects are relevant to an understanding of IK because of the concern with knowledge systems originating in particular places under particular conditions. Although IKS environments differ, there are commonalities warranting abstraction or generalization of the IKS phenomenon as elaborated in the definitions of Atte (1989) and McClure (1989).

> Whatever the implications of using these different terms, there is significant unity in the recognition that rural communities in Africa and other parts of the Third World have profound and detailed knowledge of the ecosystem and species (the natural environment) which they are in contact with and cultural settings within their respective environments. They have also developed effective ways of ensuring that this knowledge and the physical resources of the environment are used sustainably. Ethnoscience or folk science or ILK (indigenous local knowledge) is therefore the form of shared environmental knowledge, beliefs and rules and techniques for productive activities. (Atte, 1989, p. 3)

This definition is relevant to agricultural education because it raises the important issues of the recognition of IK as a knowledge system and of the nature of that knowledge (profound and detailed). The definition also points to a dimension of IK most relevant to agricultural education, i.e., sustainability.

McClure (1989, p. 1) defines IKS as: . ..learned ways of knowing and looking at the world. They have evolved from years of experience and trial-and-error problem solving by groups of people working in their environments drawing upon resources they have at hand.

McClure's definition is broader than Atte's because it includes a people's world view, which is a philosophical/ideological element of any knowledge system. This definition does, however, neglect certain important aspects of IK, i.e., dynamism, internal creativity, and experimentation, as well as contact with external systems (Warren, 1989).

Indigenous knowledge is unique in that it is generated in response to the natural and human conditions of a particular environment and context. It is dynamic and creative in that experimentation and evaluation are continually stimulated by both adaptation requirements and external influences.

## Dimensions of IKS

Another important aspect of IKS is that it covers the whole range of human experience (Atte, 1989). The dimensions of IK include physical sciences and related technologies (agriculture, ethonobotany, ethnoecology, medicine, climatology, engineering, irrigation), social sciences (politics, the military, economics, sociology, and ethnology), and humanities (communications, arts and crafts).

Several points are worth noting about the dimensions of IKS. First, the preceding listing is only illustrative and represents a limited view of the scope of IK. Second, as Atte (1989, p. 7) points out:

> In all those fields, each rural group has developed knowledge encompassing theory, concepts, interrelations, factual data and attributive information of a high degree of accuracy. Such knowledge is so good that such societies have been able to exploit them both for social organizations and productive endeavors to maintain the group.

The process of cognitive mapping, acquiring, coding, and decoding information described by Atte should be studied, recognized, and acknowledged as a possible basis for dialogue and for information exchange with farmers, who are often assumed to be ignorant according to top-down technology transfer approaches (Roling, 1988).

Third, although illustrated in a Western academic disciplines framework, IK is not compartmentalized, but is quite integrated in its cognitive, skills, and affective domains, and across disciplines. Posey (1983, p. 879) defines ethnoecology as ". ..indigenous perceptions of 'natural' divisions in the biological worlds and plants-animals-human relationships within each division." This integrated system of belief (perception), cognition, and practice (relation) observed by Posey (1983) among the Kaypo of the Amazonia is present among the indigenous peoples across the world.

Indigenous knowledge is seen as holistic and inclusive in its epistemological framework and approach to reality. In many IKS, agriculture is both technical and social in that it has strong cognitive and affective dimensions. For example, the traditional religion of the Shoona of Zimbabwe "has the

advantage of close connection with tribal leadership, and with ideas of land ownership and land fertility" (Murphree, 1969, p. 148). Their religion was administered by the chief. who as political leader; was accountable to spiritual leaders. Land management includes technical knowledge such as how to build and farm terraces, as well as religious taboos and sanctions.

Alvord (1929, p. 9), the founder of agricultural extension for Africans in Zimbabwe (then Rhodesia) and the architect of that country's Land Husbandry Act, observed that "every native farming practice...has back of it a definite (and to the native a sensible) reason. These reasons are based on tradition, superstition, worship of the departed dead and fear of the unknown." According to Njoroge and Bennars (1986, p. 146), "the cognitive dimension was thus linked directly with the normative dimension given the social character of traditional knowledge."

Several writers on ethnoecology argue in essence that because "beliefs fit together in the logic of those who believe it" it is necessary to understand this holistic, integrated knowledge and world view to avoid labeling or dismissing it as illogical or superstitious (Metuh, 1981 p. 48).

Bennett (1980) argues that human components are analytical equivalents to environmental components in the socionatural system. But, one reason for the analytical neglect of cultural values in ecological matters is that these values are often encoded in religious beliefs, rituals, ceremonies, and myths (Posey, 1983, Brokensha et al., 1980). Those accustomed to conceptualizing reality in rational, scientific, or economic terms tend to ignore or dismiss cultural values in their analyses of agricultural development in specific contexts. Recurrent themes in IKS literature related to these beliefs and practices, however, include conservation practices and ethics contributing to sustainable resource management.

## Philosophical Issues

Perceptions of IKS: Warren (1989) argues that 19th century social sciences contributed through ethnic stereotype and prejudice, to current negative attitudes towards IKS. In Africa, the alienating affects of colonization and Western educational systems contributed much to this process. The main intellectual tool used in the alienation of other knowledge systems is the Western scientific method which espouses reason as the only way of knowing.

Criticism of Western scientific epistemology has been voiced and is increasingly echoed not only by IKS promoters but by writers such as Rosnow (1981), and Sardar (1988). In these and other studies, questioning the neutrality of positivism and its exclusivity, the common criticism of Western scientific epistemology is that it is a mechanical, reductionist world view.

Perceptions of IKS have been changing. Howes (1985) categorizes these perceptions of the current literature as mystical/irrational, utilitarian, or intrinsic. Reactions to IRS by researchers, educators, development professionals, and institutions depend upon which of these perceptions is held. Figure 2 illustrates these perceptions and the responses that they evoke. Indigenous knowledge and practices perceived as mystical or irrational are often seen as obstacles to development that are to be eradicated at all costs. If the same myths, however, are viewed as a possible encodement of knowledge, there is a basis for starting with this knowledge. Attempts to identify those elements of IKS' cognitive, affective, or practical educational aspects providing the basis for genuine participation and collaboration in agricultural education and natural resource management from a people's own cultural basis would be a significant contribution towards sustainable agriculture. There is a great need for a cultural basis in the teaching-learning process, given the top-down approach and the assumed superiority of the technology transfer model in developing countries.

Emic-etic Perspective: Knowledge and understanding of IKS combined with knowledge and understanding of Western agriculture systems can result in an emic-etic approach to agricultural education. An emic analysis of behavior or phenomenon is based on internal structural or functional elements of a particular cultural system. A etic analysis is based on predetermined general concepts external to that cultural system (Lovelace, 1984). The Shona emic perspective described above provides internal conceptions and perceptions of land and natural resources. The etic perspective provides the framework for determining the effects of those beliefs on land management. Soil conservation and improvement programs on etic perspectives during the colonial era in Zimbabwe failed because they ignored emic perspectives.

IKS

| | Level of Percention | Response Evoked |
|---|---|---|
| 1. | Mystical/irrational | obstacle to development<br>inferiority complex/embarrassment<br>dismiss/ignore<br>useless |
| 2. | Utilitarian | acknowledge and accept validity partially<br>romanticism/idolization<br>skepticism |
| 3. | Intrinsic | curiosity<br>desire to learn more |

Figure 2. Responses to IKS: Levels of perception and responses evoked (adapted from Howes, 1985).

An emic-etic perspective includes the recognition of other epistimologies, and of the holistic and integrated nature of IKS. A curriculum for training agricultural and extension educators to operate in the **emic-etic** perspective provides an ideological basis for learning with and from the people.

## Technical Issues

A Confluent Curriculum: Through both nonformal and formal agricultural education programs and curricula, IKS need to contribute systematically to the study of sustainable agriculture. Inservice training programs can provide opportunities for making professionals conscious of IKS and of the contribution of these systems to sustainable agriculture. Skills to identify, collect, and develop indigenous knowledge into contemporary, useable formats are needed.

A curriculum combining the key elements of IKS with an **emic-etic** perspective is likely to produce professionals who can manage knowledge and information systems from farmers (IKS) and research stations. According to McNeil, (1985, p. 11), "The essence of confluent education is the integration of an affective domain (emotions, attitudes, values) with the cognitive domain (intellectual knowledge and abilities)." The elements of a confluent curriculum essential in the process of designing an emic-etic training approach are integration, participation, relevance, and self as object of learning (McNeil, 1985). These elements and the nature of IKS lend themselves to the principle of sequencing in curriculum development. Starting with the farmers' indigenous knowledge, educators can move from the familiar to the unfamiliar, from the concrete to the abstract in the process of promoting sustainable agriculture. A conceptual framework effecting and facilitating the recognition, acceptance, and utilization of IK in agricultural education is illustrated in Figure 3 (See next page). An emic-etic perspective provides the underlying philosophy of knowledge generation and exchange within and between all subsystems of education in agriculture. Key elements of a confluent curriculum approach ensure the balanced integration of the affective domain of educational objectives essential to recognition and utilization of IK.

### summary and conclusion

Indigenous knowledge is characterized by integrated systems of cognition, belief, and practice. Vital information on natural resource management ensuring sustainability is often encoded in unique forms such as proverbs, myths, rituals, and ceremonies. Nonformal agricultural education programs in developing countries such as Zimbabwe lack an emic-etic approach to preparing professionals for a society whose majority population is indigenous. The lack of awareness of IKS, the top-down approach of technology transfer extension models, and the alienating effects of Western education indicate a need for a confluent curriculum. Elements of a confluent curriculum, including participation, integration, and relevance, are appropriate for synthesizing IKS with current nonformal training programs. Knowledge and values creation on the basis of indigenous knowledge is a form of mental and economic decolonization, a major contribution to individual and national self-reliance and to sustainable development.

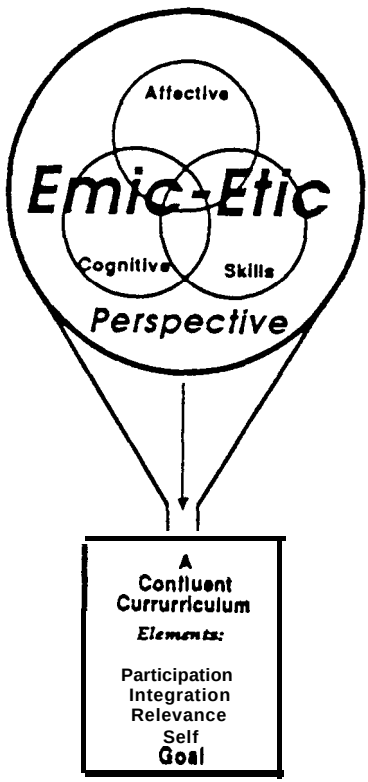



Figure 3. An emic-etic perspective for a confluence curriculum approach to IKS.