TITLE PAGE

INTEGRATION OF INDIGENOUS AGRICULTURAL KNOWLEDGE AND PRACTICES INTO NIGERIA CERTIFICATE IN EDUCATION AGRICULTURAL EDUCATION CURRICULUM

BY

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DEDICATION

This Work is Dedicated to Aged Farmers who are the Custodians of Indigenous Agricultural Knowledge.

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Abstract

Indigenous knowledge is the experience people in a given community have developed overtime and continue to develop. It is based on experience, often tested over centuries of use, adapted to local culture and environment and is dynamic and changing. Any improvement and development of a nationôs agricultural growth and progress should be based on the countryôs indigenous knowledge and practices and rooted in the nationôs educational system. Therefore, this study was designed to integrate indigenous Agricultural Knowledge and Practices (IAKP) into Nigeria Certificate in Education Agricultural Education Curriculum. The specific objectives were to determine; (i) the IAKP utilized by farmers in Agricultural productions, (ii) determine the objectives of IAKP to be integrated, (iii)determine the content for achieving the objectives of IAKP, (iv)determine the teaching methods that should be adopted in teaching IAKP,(v) determine the evaluation methods that should be adopted in assessing the objectives of IAKP, and (vi) determine the existing courses in which IAKP could be integrated in NCE Agricultural Education Curriculum. The study adopted descriptive survey design and Rapid Rural Appraisal (RRA) and was conducted in South Eastern Nigeria. Six research questions and four null hypotheses were formulated to guide the study. The population of the study was 566 subjects made up of 120 aged Farmers, 361 Extension Agents and 85 Agricultural Education Lecturers in Colleges of Education in the study area. Total sample of 327 respondents were used for the study. This consisted of 60 farmers, 182 Extension Agents, and 85 lecturers. The instruments for data collection were a structured questionnaire and interview schedule. The questionnaire comprised 163 items arranged in five sections (A, B, C, D, and E). Each section sought information on the specific objectives of the study respectively. The instruments for data collection were subjected to face validation by 7 experts and the internal consistency of the instrument was established using cronbach alpha which yielded the reliability coefficients of 0.92, 0.85, 0.88, 0.82, and 0.91 respectively for the five sections .The questionnaire was administered through personal contact while the interview schedule was used to conduct Key Informant Interview(KII) and Focus Group Discussion (FGD) Data for research question one were analyzed qualitatively; descriptive statistics were used to answer research questions two to six while t-test statistic was used to test the hypotheses at 0.05 level of probability. Based on the data analyzed, the following findings were made: (i) farmers utilized IAKP in various aspects of agricultural productions; (ii) nine specific IAKP objectives for integration into NCE Agriculture Education Curriculum were determined; (iii) different teaching methods; (iv) different evaluation techniques for assessing the objectives of IAKP; and (v) existing courses in which IAKP could be integrated in NCE Agricultural Education Curriculum were determined. Based on the findings of the study, conclusions were drawn and recommendations made which include (a) the need for proper documentation of IAKP utilized by farmers in agricultural production and integrate them into NCE curriculum for preservation and transfer to future generations; (b) policy makers should formulate policies that will promote the adoption and utilization of IAKP; and (c) Non Governmental Organizations (NGOôS) should sponsor research on IAKP.

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CHAPTER ONE

INTRODUCTION

Background of the Study

Agriculture deals with the cultivation of crops and the rearing of animals to benefit mankind. In developing countries, agriculture is characterized by fragile and difficult environment which results to low agricultural productivity (Adedipe, 1998, FAO, 1996). Farmers utilize various systems in food production activities and according to Brundtland Commission categorization of agricultural systems as reported by Adedipe (1998), three systems are recognized: First, industrial agriculture- characterized by large farm units, high capitalization, high input independence and often times subsidies supported; second, Green Revolution Agriculture - characterized by a mixture of small and large farms which exploit high yielding varieties with complementary inputs, and third, low resources or resource poor agriculture- characterized by small farm units, fragile soils, rain dependency and minimum inputs. It is to this third category that Nigeria agriculture belongs and is still trying to develop.

Despite the dominance of mineral oil exploitation as the current mainstay of the Nigerian economy in terms of foreign exchange earnings, the agricultural sector remains the largest industry contributing 37% of the GDP and employing 65% of the adult labour force (Falusi, 1997). Apart from its pivotal role in meeting the food and fibre needs of a large and growing population, agriculture provides the raw materials for the agro-industrial sector and is the largest contributor to non oil foreign exchange earnings. According to Ultimate Reference Suit (2010), almost half of all Nigerians obtain a living from agricultural production. According to them, many are small scale subsistence farmers, who produce only a little surplus for sale and who derive additional income from one or more cash crops and from the sale of local crafts. Over 90% of Nigeriaôs agricultural output is derived from small scale resource poor farmers who have for ages sustained the national food supply through a considerable wealth of environmentally related indigenous knowledge in harnessing of the natural resources and the manipulation of 1 ıic factors of production (Falusi, 1997).

Indigenous knowledge (IK) is ideas, beliefs, values, norms and rituals which are native and embedded in the minds of a people. It is a localized knowledge that is unique to a given culture or society. According to Rajasekaran (1993), IK is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments/trials and intimate understanding of the environment in a given culture. IK is the actual knowledge of a given population that reflects their experiences based on traditions and includes more recent experiences with modern technologies. It is also described as a non conventional body of knowledge that deals with some aspects of the theory, but more of the beliefs, practices and technologies developed without direct inputs from the modern, formal and scientific methods towards the management of farms.

The local people including farmers, artisans and cattle rearers are custodians of IK systems. They are knowledgeable about their own situations, their resources, what works and what does not work for them and how one change impacts other parts of their system. IK is dynamic which changes through creativity, innovativeness as well as through contact with other local and international knowledge systems (Warren, 1991b). These knowledge systems represent mechanisms to ensure minimal livelihoods for local people. IK systems often are elaborate and adapted to local culture and environmental conditions tuned to the needs of local people and quality and quantity of available resources. IK systems are available in different sectors like education, engineering, medicine and agriculture among others .IK in agriculture has evolved through ñunintended experimentationò, fortuitous mistakes and natural selection by farmers and arises from the practical judgment and skills needed to survive in a fragile soil system (Aina, 1989).Hence, the use of the term Indigenous Agricultural Knowledge and Practices (IAKP).

IAKP are organic in nature. They do not cause any damage to the air, water, and soil. They are safe to human beings and are free from causing environmental pollution. According to Sundaramari & Ranganathan (2003), IAKP is an unwritten body of knowledge that has no systematic record to

describe what it is, what it does, how it is done, means of changing it, its operations, its boundaries and its applications. It is held in different human brains, languages and skills can be found in many groups, culture and environment. It is perceived that local people such as farmers both men and women are the custodians of indigenous agricultural knowledge and practices. It is also a dynamic knowledge system, simple but very useful in providing a framework upon which technical and scientific questions are built.

Farmers employ various Indigenous Agricultural knowledge and Practices (IAKP) which is cross- cutting among the crops grown and animals reared. For example, early planting is one of the pillars of both indigenous and improved farming methods practised by farmers. This is especially important in agro-ecological zones where agriculture is rain-fed. Farmers take advantage of the early rains which also reduces the incidence of pests and diseases leading to high yields to overcome the problems of low yield and disease infestation. When farmers burn grass or trash in their farms, they prefer to plant or sow green vegetables or maize on it. The ash is assumed to be a source of nutrients and burning is believed to kill crop pests.

For centuries, farmers have planned agricultural productions and conserved natural resources with the instruments of Indigenous Agricultural Knowledge (IAK). The developments of IAK systems including management of natural environment have been a matter of survival to the people who generated these systems. Such systems are cumulative, representing generations of experience, careful observation and trial and error experiments; IAK is stored in peopleôs memories and activities. It is expressed in stories, songs, folklore, proverbs, dances, myths, cultural values, beliefs, rituals, community laws, local languages and taxonomy, agricultural practices, equipment, materials, plant species, and animal breeds. Indigenous forms of communication are important to local level decision making process and for preservation and spread of IK. (Louise, 1998).This role of communicating agricultural information is performed by Extension Agents.

Extension Agents do not only help to get information to people, but assist them in acquiring needed knowledge, attitude and skills in order to benefit from information available. They have to establish effective communication with the clientele they serve so that the recipients could utilize the information or skill to continually improve on their agriculture and rural life. Extension agents/workers transmit information through indigenous channels. These channels could be inter-generational communication involving the passing down of knowledge from father to son or lateral communication in which information is spread among peers and from place to place. Extension agents can help in documenting and transferring indigenous agricultural knowledge by bringing together an interdisciplinary team and locating those (local experts) who are most knowledgeable about the subject and communicate in the local language, names or categories in the subject of interest. For example, the extension agent can document local knowledge and practices related to agriculture by interviewing the farmers on ecological aspects, historical dimensions, socio-economic issues, describing the application of the practices or ideas, recording unique features, collecting relevant samples of materials and using standard nomenclature or conventions for documentation.

In Nigeria, farmers practise subsistence farming and are small holders. They have developed IK over generations through the process of man-environment interactions. The continuity of the IK depends on its transmission and the ability of the young generations to acquire it. IK systems have been used in Nigeria by communities to protect natural resources from unsustainable exploitation thereby averting disasters that may have occurred from such exploitation. Therefore, IK plays a vital role in sustainable agriculture because farmers are familiar with its practices and technologies. IK needs to be documented and could be of good use in devising innovative research for agricultural researchers, extension workers, development practitioners and environmentalists for sustainable agricultural development and management of natural resources. Utilizing IK in agriculture will help to ensure that farming practices do not not cause so much plant genetic and environmental erosion.

Indigenous knowledge systems are invaluable, diversified and comprehensive, although it is not always the perception among outsiders (Thurston, 1992). They are often overlooked by western scientific research and development because of their oral tradition (Warren, 1990).Most IAKP are not documented and are not included in the school curriculum from which it could be transferred to generations. In order to facilitate IAK system for outsiders to understand better the agricultural actions taken within a given society, there is need to document and integrate the IAKP into Agricultural Education curriculum in schools for sustainable intergenerational transfer.

Agricultural Education is a process of imparting knowledge, skills and attitudes in agriculture to the learner at any level. According to Osinem (2008), Agricultural Education is a process of imparting agricultural knowledge, skills and attitude to learners (young and adults) for the purpose of expanding agricultural activities. He stated that Agricultural Education is a process of educating students in various skills in agriculture either in Primary, Secondary, Farm schools, Farm centre, College of Agriculture and Universities. Agricultural Education provides learners with sound academic knowledge and skills as well as ample opportunity to apply this knowledge through classroom activities, laboratory experiments, project participation and supervised agricultural experiences. It furnishes learners with necessary communication and interpersonal skills as well as knowledge of technical agriculture to potential teachers at all levels. In order to prepare learners for success in Agricultural Education, there is need for appropriate curriculum that will be geared towards achieving the objectives of Agricultural Education (Osinem, 2008).

Curriculum refers to all the learning experiences which are planned and directed by the school to attain its educational goals (Tyler, 1975). Onwuka (1981) defined curriculum as a structured series of intended learning experiences through which educational institutions endeavor to realize the hopes of the society. Olaitan and Ali (1997) reported that curriculum appears to involve an array of activities which culminate into a written guide for teachers in the classroom in the education of pupils

to become effective members of the society. Curriculum is regarded as the process of determining and pursuing set societal objectives through the instrumentality of the school (Offorma, 2002). The school is expected to provide meaningful experiences and purposeful activities all of which must be directed towards achieving societal goals. In every society, curriculum must be a reflection of what people in the society feel believe and do.

Curriculum is planned in Agricultural Education and usually takes place within a social structure and is designed to operate effectively bearing in mind that the society is always changing and that human beings have aims and objectives to achieve in life as in the case of transferring indigenous agricultural knowledge and practices to younger generation. Considering the curriculum of Agricultural Education programme in teacher training colleges that award Nigeria Certificate in Education (NCE), most IAKP are not reflected. Curriculum is the instrument by means of which schools intends to translate the hopes of the society in which they function into concrete reality. Therefore, integrating IAKP into the curriculum of teacher training institutions will be an avenue to train teachers who will transfer the IAKP to learners.

Teachers are the implementers of curriculum at the classroom level. They are the medium through which curriculum is translated into action in the classroom (Offorma, 2002). In Colleges of Education, teachers are called Lecturers because they are professionally trained to impart knowledge, skills and attitudes to potential teachers and students in the Colleges. Also, Lecturers are expected to impart IAKP to Agricultural Education students in their various institutions if integrated into Agricultural Education curriculum. The Federal Government of Nigeria in the National Policy on Education (NPE) (2004) stated that the minimum qualification for entry into the teaching profession shall be the Nigeria Certificate in Education (NCE). Teachers are professionally trained in various institutions in Nigeria which include; Colleges of Education, Institutes and Faculties of Education in the Universities. Students in Colleges of Education are trained to teach in the Basic schools (i.e.

Primary and Junior secondary schools). The Basic School curricular are developed and packaged by the Nigeria Education Research and Development Council (NERDC) while the curriculum for Colleges of Education is developed by the National Commission for Colleges of Education (NCCE).

Since potential Agricultural Teachers for younger and future generation are trained in Colleges of Education and other teacher training institutions after which they are certified with Nigeria Certificate in Education (NCE) in Agricultural Education, integrating IAKP in their curriculum will help to produce teachers that will transfer IAKP to young people in Basic Schools, hence the generation gap that exists in agricultural productions could be closed and the young generation would learn of IAKP which they may not have obtained from the aged farmers, or parents and Extension Agents.

Integration is the act or process of combining two or more things so that they work together (Hornby, 2001). Integration in this study entails combining IAKP with the existing NCE Agricultural Education curriculum for the training of pre-service and in- service teachers of agriculture in Colleges of Education. Also, the process of curriculum planning and development will be followed, which according to Offorma (2002) refers to a complex process of deciding what is to be taught at various levels of education. The study will focus on the objectives, content and evaluation procedure to adopt in integrating IAKP in NCE curriculum.

An objective is a statement of the expected or desired learning outcome from a particular learning activity (Offorma, 2002). It is stated in terms of anticipated studentsô achievement and at different levels such as understanding (Knowledge), skills (practical performance) and affects (appreciation).IAKP objectives will help in the selection of the content, learning experiences, resource materials, methods and evaluation techniques in this study. Indeed these are related to the objectives because at each stage, the focus is on achieving the stated objectives.

Content according to Offorma (2002) is described as the knowledge, skills, attitudes and values to be learned. Content of IAKP is regarded as those practices, related facts, observations, data, perception, discernments, sensibilities, designs and solutions drawn from what the mind of individuals have comprehended from accumulated farming experiences and those constructs of the mind that re-organize and re-arrange those products of experience into core ideas, concepts, generalizations, principles, plans and solutions (Osinem, 2008).

Learning experiences refer to the interaction between the learner and the external conditions in the environment to which he would react. It refers to the activities which the learners are engaged in the process of learning. It covers what the student does in the course of reaction to the learning situation provided by the teacher. Thus, learning experience is a function of the learnersô perception, interest and previous experience (Offorma, 2002).

After the objectives have been formulated, the content and the learning experiences selected are organized, the evaluation follows. Evaluation is the process of finding out the strengths and weaknesses of the whole curriculum endeavour. It can be regarded as the means of finding out what the students have learned and what they have not learned in relation to IAKP and practices or what gap remains to be closed. IAKP are cumulative, representing generations of experiences which are stored in peopleôs memories; hence, there is need to identify, document and integrate them into the school curriculum for transfer to generations especially as it relates to the curriculum of the Colleges of Education who train teachers of Agriculture that will teach in Basic Schools in the society.

Statement of the Problem

For centuries, farmers have planned agricultural production and conserved natural resources with the instruments of Indigenous Knowledge (IK). The development of IK systems has been a survival strategy for the people who generate these systems. Such systems are cumulative, representing generations of experience, careful observations and trial and error experiments (Louise,

1998).Warren (1992) reported that IK has much to offer for sociological and cultural diversity and resource management because indigenous people are an integral part of the ecosystem they manage.

Many of todayôs modern technologies have roots in indigenous practices; for example, primitive farmers had knowledge of soil fertility, selection and treatment of seeds, seasons of sowing and harvesting, crop rotation, manuring and other cultural practices. Therefore, IAKP can play a key role in the design of sustainable and eco-friendly modern agricultural systems, increase the likelihood that the rural population will accept, develop and maintain innovations and interventions. Thus when modern techniques are integrated with the traditional and indigenous practices in agriculture, it would alleviate poverty resulting to the prosperity of the country.

In Nigeria, many of the IAKP and other indigenous knowledge systems have been arbitrarily replaced by modern technologies. Most of them have become obsolete especially among the younger generations .In countries like China and India, they depend so much on their Indigenous knowledge system which has helped them in several areas of life to solve peculiar problems .Every environment is peculiar therefore there is need to adapt to the local environment for survival.

Again, IAKP system seems to be deteriorating due to the deaths of elderly people since there seem to be no formal documentation of such knowledge. In some cases, some individuals deliberately refuse to share the knowledge of IAKP they possess with others due to selfishness and desire for monopoly and power. Furthermore, most of IAKP have not been systematically documented and thus not well appreciated among the younger generation. The failure to document and integrate IAKP in the school curriculum may have contributed to its neglect. Instead of documenting and utilizing these IAKP, efforts are focused on contemporary scientific knowledge systems and practices some of which fail to address the agricultural and environmental concerns of the people.

The negligence of IAKP has made it difficult to determine and establish the extent to which people use it in their various activities to ensure sustainable agricultural development. Now that the

IAKP appears to be endangered because they have not been documented, there is the possibility of them becoming extinct during this era of globalization, liberalization and commercialization. Content analysis of the present NCE agricultural curriculum revealed a total absence of IAKP elements in the various course structures (see Appendix 2). Therefore, there is need to systematically identify, document and integrate IAKP into NCE Agricultural Education Curriculum for training teachers who could after their training impart IAKP to younger generation in Basic Schools. This will help to reduce dependence on external inputs, check the cost of cultivation, propagate eco-friendly agriculture and transfer IAKP to generations. Hence, the study will identify and document IAKP for integration into NCE Agricultural Education Curriculum.

Purpose of the Study

The purpose of this study was to integrate Indigenous Agricultural Knowledge and Practices (IAKP) into Nigeria Certificate in Education (NCE) Agricultural Education Curriculum. The specific objectives were to:

1. Identify IAKP utilized by farmers in agricultural productions;
2. determine the objectives of IAKP to be integrated into NCE Agricultural Education curriculum;
3. determine the content that should be utilized to achieve the objectives of IAKP to be integrated into NCE Agricultural Education Curriculum;
4. determine the methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum;
5. determine the evaluation methods to be adopted for assessing the attainment of the objectives of IAKP in NCE Agricultural Education Curriculum; and
6. determine the courses into which IAKP could be integrated into NCE Agricultural Education curriculum.

Significance of the Study

The study identified the IAKP utilized by farmers in the study area and determined courses in which elements of IAKP could be integrated into NCE Agricultural Education Curriculum. Therefore, the outcome of the study would be beneficial to policy makers, researchers, extension agents, farmers, students and curriculum planners.

Through the identification, the study will present an exhaustive list of IAKP in crop production, livestock production, soil conservation and ethno-veterinary medicine which will be stored for the future thereby closing of the gap that exists in agricultural knowledge transfer. The IAKP identified should be considered by policy makers as complimentary to modern technologies that require high external input, more risks and hazardous to the environment. Again, researchers could use the list of IAKP identified for test verification and then select viable eco-friendly technologies for popularization.

Extension services will be facilitated by the findings of study through providing a package of IAKP that should be encouraged and the ones to be discouraged during transfer of technology programmes. Also, the methodology adopted for this study could be utilized by both researchers and extension workers to identify the effective IAKP in future.

Since IAKP are borne out of creativity of farmers, the study could be a source of pride for them, and all concerned would realize their importance in the technology development processes of the society. Moreover, through the knowledge of IK in agriculture which the study will reveal, learners and farmers will know their cultural background and how things originated. They will understand themselves fully and have confidence in what they can do by themselves.

The findings of the study on determining the objectives, content, teaching methods and evaluation procedure to integrate IAKP into NCE Agricultural Education Curriculum could be utilized to fill the generation gap in agricultural knowledge transfer. NCE graduates of Agricultural

Education that are expected to teach in the Basic Schools, to impart IAKP to young generation. Also, with the integration, the NCE graduates of Agricultural Education could be equipped with the IAKP knowledge, skills and attitudes necessary for impartation of Agricultural knowledge in Basic School in the society.

Furthermore, the findings will help curriculum planners to introduce innovations into the NCE Agricultural Education Curriculum by building on the study of IAKP. National Commission for Colleges of Education (NCCE) will utilize the findings of this study to prepare curriculum guidelines for Colleges of Education and reform the existing curriculum.

Research Questions

The following research questions guided the study:

1. What are the IAKP utilized by farmers in agricultural productions?
2. What are the IAKP objectives that should be integrated into NCE Agricultural Education Curriculum?
3. What content that should be utilized to achieve the IAKP objectives to be integrated into Agricultural Education Curriculum?
4. What teaching methods should be adopted in teaching IAKP in NCE Agricultural Education Curriculum?
5. What evaluation methods should be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum?
6. What are the courses in which IAKP could be integrated into NCE Agricultural Education curriculum?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

HO_1: There will be no significant difference in the mean responses of lecturers and extension agents on the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

HO_2: There will be no significant difference in the mean responses of Lecturers and Extension Agents on the content that should be utilized for achieving the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

HO_3: There will be no significant difference in the mean responses of Lecturers and Extension Agents on the methods to adopt in teaching IAKP in NCE Agricultural Education Curriculum.

HO_4: There will be no significant difference in the mean responses of Lecturers and Extension Agents on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum.

Scope of the Study

The study focused on identifying IAKP in selected crop production (Yam, Cassava, and Maize), livestock production (Goat and Poultry), soil conservation and ethno-veterinary medicine in the study area. It also sought to integrate IAKP into NCE Agricultural Education Curriculum focusing on objectives, content, teaching methods and evaluation methods. The study is not meant to validate or measure the effectiveness of IAKP. The study area was limited to South-East geo-political zone comprising: Abia, Anambra, Ebonyi, Enugu and Imo states

CHAPTER TWO
LITERATURE REVIEW

This chapter deals with the review of related literature. It was organized under the following headings.

1. Conceptual Framework

i. Indigenous Knowledge (IK)

ii. Indigenous Knowledge and Practices in:

- crop production;

- livestock production;

- soil conservation; and

- ethno veterinary medicine.

iii. Documentation of IAKP

iv. Agricultural Education Programme in Nigeria

v. Selecting curriculum objectives and content in Agricultural Education

vi. Teaching methods in Agricultural Education

vii. Evaluation in Agricultural Education.

2. Theoretical Framework

i. Curriculum Development Models/Designs

3. Related Empirical Studies

4. Summary of the Literature Review.

Conceptual Framework

Concept of Indigenous Knowledge (IK)

The term ñIndigenous Knowledgeò (IK), was coined by Brokensha, Warren and Werner in their 1980 edited work on Indigenous Knowledge Systems and Development. According to Warren (1996) IK was constructed by the above named three (and independently by Robert Chambers in the UK at the same time) in an effort to overiases associated with the term ñtraditionalò that

had been used to that point. Their goal, was to find a term that represent the dynamic contributions of any community to problem solving, based on their own perceptions and conceptions, and the ways that they identified, categorized and classified phenomena important to them (Warren, 1996).

Recently, IK has come to be recognized as ñlocal knowledgeôô that is unique to a given culture or society. It is the information base of a society which facilities communication and decision making. It is a systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture(Rajasekaran, 1993).According to Harverkort (1991),IK is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. Local people including farmers, landless labourers, women, rural artisans and cattle rearers are custodians of indigenous knowledge systems of a community. Moreover, these people are well informed about their own situations, resources, what works and do not work for them and how one change impact other parts of their system.

IK is ideas, beliefs, values, norms and rituals which are native and embedded in the minds of people. It is dynamic and changes through creativity and innovativeness as well as through contact with other local and international knowledge systems (Warren, 1991). These knowledge systems represent mechanisms to ensure minimal livelihoods for local people. IK Systems often are elaborate and adapted to local culture and environmental conditions tuned to the needs of local people and quality and quantity of available resources. According to Adedipe (2004), IK is described as a non conventional body of knowledge that deals with some aspects of theory but more of the beliefs, practices and technologies developed without direct inputs from the modern, formal, scientific establishment, towards the management of farms, hence it is called Indigenous Agricultural Knowledge and Practices (IAKP). IAKP has therefore, evolved through unintended experimentation,

fortuitous mistakes and natural selection by farmers and arises from the practical judgment and skill needed to survive in a number of environmental challenges.

Warren (1992) clarified that the term indigenous knowledge is used synonymously with traditional and ólocalô knowledge to differentiate the knowledge developed by a given community from the international knowledge system sometimes also called ówesternô system, generated though universities, government, research activities in different countries and private industry. IK refers to the knowledge of indigenous people as well as any other defined community. Fernandez (1994) indicated that the terms óindigenousô and local knowledge are used to refer to knowledge which is generated and transmitted by communities over time, in an effort to cope with their own agro ecological and socio-economic environments.

Parvathi (1995) defined IK as the knowledge in-built-in the system itself by virtue of informal documentation or practices evolved by the farmer clients over the years to generate technologies that have been proven sustainable. It was also defined as the sum total of knowledge and practices which are based on peopleôs accumulated experiences in dealing with situations and problems in various aspects of life and such knowledge and practices are special to a particular culture.

As defined by Marrewijk (1998), IK is the sum total of the knowledge and skills that people in a particular geographic area possess and which enable them to get the most out of their natural environment. Most of this knowledge and skills have been passed down from earlier generations, but individual men and women in each new generation adapt and add to this body of knowledge in a constant adjustment to changing circumstances and environmental conditions. According to Eyzaguirre (2001), IK in the form of local know-how and cultural practices is a set of tools that communities used to manage their natural resources, which include genetic resources, the building blocks of biodiversity and agriculture. As observed by Talawar and Singh (1994), the agricultural practices followed by the farmers that are evolved locally are refered to as indigenous agricultural

practice (IAPs).Rambabu (1997) defined Indigenous Agricultural Knowledge and practice as knowledge and practices developed by the local farmers based on the topography, local agro- climatic conditions and available resources through non-formal experiments.

Having reviewed the above perceptions and ideas, Indigenous Agricultural Knowledge and Practices (IAKP) may be operationalized as those knowledge and practices developed and possessed by farmers in a given geographical area and/or those knowledge and practices which draw on the local inputs, ideas and internal solution. Hence the study is focused on identifying those knowledge that are rooted in the culture of the people in the study area for integration into NCE Agricultural Education curriculum.

Characteristics and Importance of IAKP.

Indigenous knowledge is dynamic, changing through indigenous mechanisms of creativity and innovativeness as well as through contact with other local and international knowledge systems (Warren, 1991). These knowledge systems may appear simple to outsiders but may represent mechanisms to ensure minimal livelihoods for local people. IK systems often are elaborate and are adapted to local cultural and environmental conditions. IK systems are tuned to the needs of local people and the quality and quantity of available resources. They pertain to various cultural norms, social roles or physical conditions. Their efficiency lies in the capacity to adapt to changing circumstances. According to Norgaard in Rajasekaran (1993);

> *Traditional knowledge has been viewed as part of a romantic past, as the major obstacle to development, as a necessary starting point, and as a critical component of a cultural alternative to modernization. Only very rarely however is traditional knowledge treated as knowledge per se in the mainstream of the agricultural and development and environmental management literature, as knowledge that contributes to the understanding of agricultural production and the maintenance and use of environmental systems.*

Rajasekaran (1993) maintained that indigenous knowledge are: (a) adaptive skills of local people usually derived from many years of experience that have often been communicated through

oral traditions and learned through family members over generations; (b) time-tested agricultural and natural resource management practices, which pave the way for sustainable agriculture; (c) strategies and techniques developed by local people to cope with the changes in the socio-cultural and environmental conditions;(d) practice that are accumulated by farmers due to constant experimentation and innovation; (e) trial and error problem solving approaches by groups of people with an objective to meet the challenges they face in their local environment; and (f) decision ï making skills of local people that draw upon the resources they have at hand.

The above statements clearly illustrated that IK systems are invaluable, diversified and comprehensive, although is not always the perception among outsiders. In fact, they are often overlooked by western scientific research and development because of their oral tradition (Warren, 1990). Hence, by facilitating these systems, outsiders could understand better the basis for decision-making within a given society.

In the emerging global knowledge economy, a countryôs ability to build and mobilize knowledge capital is equally essential for sustainable development as the availability of physical and financial capital (World Bank, 1997). The basic component of any countryôs knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood. According to World Bank Report (1997), significant contributions to global knowledge have originated from indigenous people, for instance, in medicine and veterinary medicine, with their intimate understanding of their environments. IK is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with the peoples cultural values. IK is also the social capital of the poor, their main asset to invest in the struggle for survival, to produce food, provide for shelter or achieve control of their own lives.

Furthermore, World Bank (1998) in its report noted that IK provides the basis for problem-solving strategies for local communities especially the poor. It represents an important component of global knowledge on development issues. IK is an underutilized resource in the development process. Learning from IK, by investigating first what local communities know and have, can improve understanding of local conditions and provide a productive context for activities designed to help communities. Understanding IK can increase responsiveness to clients. Adapting international practices to the local setting could help improve the impact and sustainability of development assistance. Sharing IK within and across communities and help enhance cross ï cultural understanding and promote the cultural dimension of development.

Pamela (1994) pointed out that the IK systems have a great deal to offer in terms of genetic resources, food production and preservation, medicines, clothing, shelter, fuel, tools, techniques and crop and animal protection. These systems are varied, adaptable, nature friendly and produce yields that are not necessarily lower than the modern agriculture and concluded that in absence of appropriate modern alternatives, IK had become a starting point for academic and other institutions in their search for solutions to environmental pollution and genetic erosion.

Rajapakse (1994) observed that the promotion of traditional food varieties that require minimum inputs under favourable soil and weather conditions can supply a stable yield as an alternative policy scenario to improve the food security of rural household. According to the International Institute of Rural Reconstruction (IIRR) (1996), IK systems are holistic in nature; they integrate culture and religion and minimize risk rather than maximizing profit. IAKP are cost-effective, time tested, eco-friendly and serve to sustain the agricultural development.

Mendoza (1999) noted that when faced with difficulties in implementing their activities, farmers try to innovate or adopt existing innovations depending on the available resources. Gupta (2000) reported that IK has a tremendous potential for restoring the economic and ecological balance.

Rajasekaran (1993) indicated that in all agrarian societies, indigenous food production systems form the basis of food and nutritional security. He insisted that IK could be used to fulfill socio-economic needs and conserve biodiversity at one and the same time. He further stressed that identifying, documenting and incorporating IAKP in agricultural extension organizations and school curriculum was essential in order to achieve sustainable agricultural development.

Yamana and Bishnu (2005), writing on the characteristics of IK related to Agriculture noted the following:

1. **Less dependent on external inputs:** Low dependency on external inputs is one of the basic tenets of IK. Farmers do not use the external inputs and even if occasionally used, they do it as supplemental to ensure the production potential. For example, inter-cropping, mixed cropping with legumes increases reliance on biological fertility that reduces the need for external nitrogen and help in pest management that minimizes the demand of external pesticides, which is safe for the farming community, environment and produce consistent yield (Altheri, 1994). Nevertheless, Indigenous Agricultural sector is forced or influenced by unsustainable external technologies and inputs.

This situation is increasingly disturbing the stability of food production and threatening the sustainable indigenous farming system adapted to their environment which relies on local resources and conservation of natural resources. External technologies and inputs are not being argued to be prohibited but that the external inputs and technologies which are not accessible to resource poor farmers and are promoting interests of profit oriented giant multinational and transnational companies should not disturb the local farming systems upon which vast majority of the world population depends (Yamuna and Bishnu, 2005).

2. **Maximum utilization of local resources:** IK are based on proper use of local resources for food production. The production practices that existed in the resources poor agricultural sector such as agro forestry, integrated pest management, integrated nutrient supply, multiple cropping system,

integration of livestock, water harvesting and conservation, selection and breeding of crop and livestock based on maximum local resource use that forms one stable agro-ecological system for sustained food production. Application of IK and skills on integrated nutrient supply and pest management, appropriate selection of crop varieties and animal breeds help to make the resources poor agricultural system viable and sustainable as it prevents the over exploitation and degradation of local natural resources and enhance food production. Sustainable food production in this context refers to the capacity to remain productive while sustaining the resource base. Therefore, the basic indicator of sustainable resource poor agriculture system is ability to maintain and enhance its production performance without damaging long term production potential which is rapidly damaging by the external modern technological interventions.

3. Development, use and dissemination of local technologies: Resource poor farmers from developing countries have been practicing different indigenous technologies through crop-livestock-forest integration for centuries. Terracing, slicing terrace risers, flood water harvesting, application of organic matter, in-situ manuring and inclusion of legumes in crop rotations are all built in agronomic practices to secure food production and sustain ecological dynamics. These are result of continuous efforts over many generations that stablize production, supply plant nutrients and improve soil condition.

IAKP depend on local conditions and resource availability. These resource poor farming practices make use of agro-ecological processes of predation, competition and parasitism to control pest effectively (Altieri, 1994). Hence, local techniques of farm management indeed are well adapted to their environment, rely on local resources, conserve natural resources and obtain the potential production sustainable. The development and dissemination of local technology, optimal use of natural resources and so on are the basis of indigenous agricultural practices. However, these practices are not only severely threatened by the vested interests-based external interventions, but

also heavily, distributed the social settings of resources poor agricultural systems in the developing world.

4. Coping Strategies and adjustment to adverse condition: The least the effect of external technological intervention in a complex indigenous agricultural systems, the more buffered it is against disturbance. Stability can be thought of as the ability of an indigenous agricultural system to continue to function when stressed, because it is a living system and is comprised of components that reproduce. Stability also embraces the idea of regeneration (Pretty, 1995). In ecological terms, the ability to regenerate following a stress in other words ï resilience is found in indigenous agricultural system. Thus the diversified indigenous farming systems can cope with the scarce resource situation and unforeseen farm problem (drought for example) and are still able to maintain subsistence levels. Nevertheless, these diversified, resilient indigenous farming systems have been irrationally damaged by external interventions (e.g. terminator technology, bio-piracy, pesticides, hazard, genetically modified organisms etc).

5. Recycling of farm-produced resource: Use of renewable products is a common characteristics found in IAKP. The greater the recycling of resources, the system because more sustainable. Interdependence between crops contributes to the synthesis of farmyard manure that is the major sources of plant nutrients. The field, forest and pasture provide feed and bedding materials to the animal and in return, the field and pasture land receives nutrients from livestock.

IAKP are that knowledge and practices developed and possessed by the farming community in a given geographical area or those practices which draw on local inputs, ideas and internal solutions. Integrating IAKP into the curriculum can contribute to local empowerment and development, increasing self sufficiency and strengthening self determination (Thrupp, 1989) Again, indigenous people could provide valuable input about the local environment and how to effectively manage its natural resources. Outside interest in IK systems has been fueled by the recent worldwide

ecological crisis and the realization that its causes lie partly in the overexploitation of natural resources based on inappropriate attitudes and technologies.

Scientists now recognize that indigenous people have managed the environments in which they have lived for generations, often without significantly damaging local ecologies. Many feel that IK could thus provide a powerful basis from which alternative ways of managing resources could be developed. IK technologies and know-how have an advantage over introduced forms in that they rely on locally available skills and materials and are thus often more cost-effective than introducing exotic technologies from outside sources (IIRR, 1996). Moreover, local people are familiar with them and so do not need any specialized training .The study identified IAKP utilized by farmers in crop and animal production as well as their knowledge in ethno-veterinary medicine for integration into NCE Agricultural Education curriculum for training teachers that will teach in Basic Schools achieving IAKP transfer to generations.

IAKP in Crop Production

Indigenous knowledge is a local knowledge that is unique to a given culture or society, so IAKP is a local agriculture knowledge and practices that is unique and peculiar to a given culture or society. Sundaramari, and Ranganathan (2003) pointed out that indigenous practices in agriculture are organic in nature, and do not cause any damage to the air, water and soil, safe to human being and are free from causing environmental pollution. These practices are dynamic because they are region specific depending upon soil type, rainfall, topography etc and are often modified by the local farmers. Agriculture is the major interface between humans and the environment. IK not only preserves the past but vital to ensuring a sustainable future (Summer, 2006). IK in agriculture can be applied in crop production, animal production, soil and water conservation, ethno-veterinary medicine etc and are in the hands of indigenous farmers.

Farmers employ various indigenous practices most of which are cutting across the crops they grow. Early planting is one of the pillars for both indigenous and improved farming methods. This is especially important in agro-ecological zone where agriculture is rain-fed. According to Birungi, Winnie, Aliguma and Barwogeza (2007), farmers take advantage of the early rains which also reduce the incidence of pests and diseases attack in the farm. IK in agriculture starts from field selection to marketing of agricultural produce (Summer, 2006). IK in agriculture is highly developed, consciously resistant to unsustainable practices in agriculture. In line with these, agriculture is based on the knowledge that the soil, animals and humans work together in one agricultural cycle.

Results of studies reported by Handawela (2001) in Sundaramari and Rangananthan (2003) confirmed that the returns per unit of cash invested on indigenous practices were higher than those modern techniques, crops on plots with higher Indigenous Agricultural Practices proved hardier (i.e. these crops were better able to withstand water scarcity thus reducing the risk on the part of farmers). Further, the authors confirmed the pods and grains yields from plots having much indigenous practices were of better quality and were selected for display at an agricultural exhibition. Also more honeybees were observed in the fields of indigenous practices. Kumar (2001) reported that he was able to obtain 3 to 5 tons of additional cane yields from the sugarcane fields applied with organic manure alone as compared to the fields with chemical fertilizers.

Birungi et al (2007) reported the Indigenous Agricultural knowledge and practices utilized by farmers in crop production thus: (a) When farmersô burn grass or trash in their farms, they prefer to plant or sow green vegetable and millet in it. The ash is assumed to be a source of nutrients and also burning was believed to kill crop pests; (b) Farmers practice selection of clean planting materials to control pests and diseases; (c) In cassava production, they ensure that the cuttings were not damaged prior to planting and that stems were noted to face upwards to encourage effective sprouting and root growth; (d)Farmers in tobacco growing areas preferred to plant root crops in plots that originally had

tobacco to specifically control pests; (e) Farmers used rudimentary post harvest handling techniques in sweet potatoes fields. For instance; many root crops were highly perishable crop when harvested. When farmers harvest cassava and not all of them were consumed or sold, the fresh tubers were buried in moist soil measuring one foot deep. According to the farmers, the tubers stayed fresh for up to seven days; (f) for cassava processing, the indigenous practice involves peeling, slicing, drying and storing in baskets. For bitter cassava varieties, it was peeled, sliced and left to ferment indoors for three days. It was later dried, chopped and finally ground or pounded into flour. Fermentation were reported to reduce the cyanide level or the bitterness of the cassava; (g) For grain crops like beans, farmers ensured that beans are planted as the second crop in the rotation system. Broadcasting the seed before ploughing was still a popular method used when planting. Early planting is also preferred to allow crops receive enough rainfall and reduce pest and diseases incidences ;(h) Farmers used concoctions of ash, goat droppings, and water as insecticide to control pests and diseases. Ash was also used as an important component for preserving grains. Some farmers mixed ash with water to form a light paste and added to grains before storing in containers made from dry banana leaves, fibres and sticks; (i) Farmers put elephant grass flowers and leaves of neem tree in grain because the scent produced by the plant species repels storage pests; (j) Caterpillars were reported as the most important sweet potatoes pests. They were controlled by picking the infested leaves and burying them. Ash was sometimes mixed with human urine and sprinkled on vines. Farmers also carried out some form of rudimentary biological control of pests. They caught black ant and released them in sweet potatoes fields to eat the caterpillars. From years of experience, farmers knew which crops required fine seed beds and which ones did not and when they come in the rotation system; (k) Banana suckers with weevils were rouged and pseudo stems split and placed upside down on the stools to trap weevils. Urine was applied on banana stool to kill banana weevil. According to Birungi et al (2007), this partly explained the resistance of banana stools to pests and diseases near kitchen

since the kitchen was always a source of ash and its compound particles. Farmers mixed banana varieties when planting to control pests/diseases; and (l) to control tomato blight, the crop was sprayed with baking flour. A mixture of fresh urine and water at a ratio of 1:1, African marigold leaves, pepper and tobacco leaves are added to the mixture and kept fermented for two weeks. This concoction was mainly used to control pests in vegetables and banana.

The review above showed that farmers utilized various aspect of IAKP in crop production, hence the study will identify the IAKP utilized by farmers in crop production for integration into NCE Agricultural Education curriculum. This would ensure that IAKP was preserved for posterity.

IAKP in Livestock Production

Indigenous Agricultural knowledge and Practices was mainly applied to crop production than in livestock production. Birungi et al (2007) conducted a study on indigenous knowledge used in farming in Uganda and reported that farmers mainly used IAKP on chicken and goats than on the rest of animals and birds. Birungi et al (2007) reported the following findings on the use of IK in chicken and goat production:

(a) When a brooding hen abandons the eggs completely because of pest infestation like mites, farmers put dry banana leaves in a mortar and position it near a fireplace to aid the eggs brooding process. The eggs were regularly turned and eventually the chicks hatched; (b) Farmers prepared and placed a small bottomless basket to encourage hens to lay more eggs and hatch many chicks. The baskets were placed in a small round hole lined with dry banana leaves; (c)

- Framers supplemented feeds for hens with millet and maize to encourage hens to lay more eggs. The eggs were removed regularly in order to increases the number of eggs laid.; (d)
- Chicken were fed on a mixture of millet and paraffin to prevent coccidiosis. Chicken infected with coccidiosis were injected with or given mixture of ash, ground pepper and water to drink. Cannabis was mashed and added to water and used for treating coccidiosis. Farmers also

make an incision under the chicken wing to prompt bleeding from the vein of an infected (with coccidiosis) chicken. The vein was usually distinct that is dark in colour; (e) Farmers gave chicken insects from empike to peck in order to control New castle disease. The cannabis leaves were also pounded and added to water, boiled and given to the chicken and other birds. The cannabis could also be given to chicken to peck for the same purpose; (f) To destroy pests, farmers applied Paraffin and Vaseline on the affected area especially around the chicken eyes. An old tyre is burnt in chicken coop to destroy mites. Farmers also cut and place a moist tree branch in the chicken coop to attract and trap mites which were removed and thrown far from the house stead when it was laden with the pests. In tobacco growing areas, farmers spread fire cured tobacco leaves on the chicken coop floor to kill mites; (g) Farmers gave potato leaves to chicken to peek as de-worming agent. It was reported that the same leaves were used for de-worming humans. Pawpaw seed are also given to chicken as de-wormer; (h) Farmers used their hands to aid goats experiencing difficulties while delivering. In case placenta failed to disengage, they gave the goat cowpea leaves. Others preferred to hit the bottom of the goats with brooms to easy the release of the placenta. Another remedy was giving goats a mixture of enderema, water and salt to aid disengagement of the placenta after the goat delivers. When a pregnant goat fails to delivered, it was tied near a fire place to presumably burn fats believed to block delivery; (i) Worms in animals were treated using omugina (green vegetable) with a specific measure that farmers know. Diarrhea was treated using a mixture of cowpea leaves and little salt. The mixture would either be boiled or not. Potato leaves were also used to treat diarrhea in goat; (j) Fresh cannabis leaves and little salt were mashed and added to water to treat goats suffering from fever, cough, poor appetite and/or diarrhea;

(k) To increase milk production, farmers added salt to banana peels and beans soup and feed them to their animals to increase milk production; (l) Farmers castrated their animals using a rudimentary method which was by cutting veins leading to testicles, using a sharp razor blade or small surgical blade; (m) Mastitis was treated by directly pressing a hot metal on the affected areas ;(n)Farmers used a tedious approach of pricking fleas with a needle and leaving them to die on the animal to control the pest; and (o) Some livestock experience constipation and in the case of such condition, farmers mashed leaves of elephant grass and neem tree with some salt and gave them to suffering animal.

Again as reported by Ibrahim (1999), Hausa and Fulani women managed the household poultry, goats and sheep. They also have an in-depth knowledge of the varieties and quality of indigenous medicine for preventing/curing animal diseases. Indigenous farmers possess specific management techniques which differed from one region to the other and depended solely on the available materials within that particular ecological zone. The present study will identify the IAKP utilized by farmers in livestock production for integration into NCE Agricultural Education curriculum.

IAKP in Soil Conservation

Framers employ various IAKP, most of which were cutting across their agricultural activities including soil conservation. In their study on the challenges in sharing knowledge of past generations in the globalized context in Uganda, Birungi et al (2007) pointed out some of the IAK and practices utilized by farmers in soil conservation. These include: (a) Farmers expressed reasonable knowledge of soil fertility indicators. This is mainly determined by soil characteristics, types of weeds growing in an area and crop characteristics such as yields, vigor and the general appearance of the plants. Soil types, degrees of soil fertility and land use categories were also desegregated by farmers. Colour, texture and even taste usually distinguish soil types while some classified their soils based on

vegetative cover; (b) Farmers can determine when the soil is exhausted. The water retention level reduces substantially (becomes too porous), the plants/crops or weeds are stunted and yellowish and the crop yield decline at an increasing rate. Decline in soil fertility is also determined by evident loss of crumb structure. It also becomes very light, dusty or sandy in texture. The soil colour changes from dark or brown to reddish with increased number of stones. When soil is exhausted, it allows the growth of weeds like spear grass and euphoribia species which indicate soil infertility ;(c) Farmers use various means at every stage of plant growth to cope with the problems of soil fertility loss. This include: making mounds by collecting and heaping trash in preparation for planting sweet potatoes, solanium, tobacco and vegetables which are preferably planted on raised seed beds; (d) Other common practices are fallowing and planting elephant grass at the beginning of fallow period, for one season up to four depending on land availability. Intercropping beans and maize, groundnut and maize, millet and maize and agro forestry was practiced especially for fruit trees and coffee to improve soil fertility. Crop-rotation where cassava were planted as last crop in rotation is also a popular practice as many farmers believe that cassava was not a heavy feeder and that when cassava leaves wither and drop, they decompose and add manure to the soil; and (e) Farmers heap soil and trash around the plant while weeding and make bunds. Water runoff and/or soil erosion are reduced using soil bunds. Farmers also add crop residues like kitchen waste/refuse and manure from goats, chicken and cattle to their fields and fallow plots to enhance nutrient status. Farmers mostly use elephant grass and maize stalks to conserve soil moisture and add manure after decomposition when mulching. Mulching was practiced in at least 4 out of 10 households in every village. Many farmers had stopped the bush burning practice and were making and applying compost manure.

Mckell (2007) reported that farmers are central players in the promotion of soil conservation in agriculture. They noted that soil degradation was still prevalent over large areas of the world and thus the achievements to date were viewed as the launching pad for greater effects in the future.

Again, they found in their research that the introduction of non- tillage result to improved soil physical characteristic such as aggregation, bulk density, etc, as well as improved soil pH, nitrogen and phosphorus level. According to Aguilar (2001), the pH of the soil at all depths under non-till was closer to neutral than with conventional tillage. This could be due to the increased organic matter and its buffering capacity. Also, organic carbon and soil organic matter increase in the surface layers and total nitrogen showed a clear tendency to be higher in the no- tilled situation. In addition, the nitrogen efficiently ratio is regularly higher in non- till than for conventional tillage. In most cases, there are improved levels of soil phosphorus.

Mckell (2007) further reported that no till over time results to the formation of surface mulch which was high in plant nutrients, but which also protected the soil from erosion and shelter and feeds the micro and meso flora and fauna which thrived in these conditions. This increased the agro biodiversity and the soil biotic load. Generally, the longer the soil was under non- till, the healthier and more productive the agroecosystem became. Erosion and soil determination disappear, fertility and productivity improves, water quality improves and wildlife habitats for nesting birds, rodents etc improve. At the same, time, higher production was achieved with less inputs resulting to higher profit margins. Non- till was a classic situation for agriculture and the environment.

Dialla (2000), pointed out eight soil conservation practices used by local farmers and promoted by extension services to include: (a) Application of manure; adding organic waste generally from animals to the soil; (b) Microcatchment; building dirt terraces in the field in order to slow water runoff; (c) Stone lining; placing rows of stones either around or across the fields following the curvature of the land. Stone lining slows water runoff and allows infiltration; (d) Mulching: Leaving crop residues in the field and bringing in foliage and other organic materials from elsewhere; (f) Fallow: letting the cultivated land rest for a certain period before using it again; (g) Living hedges; planting shrubs or small trees around fields in order to keep residues in plane; (h) Strips of

vegetation; preserving strips of vegetation about one meter wide which follow the curvature of the land. The interval between two strips depends on the slope but is usually ten trees. Strips of vegetation can be used in combination with stone lining; and (i) Reforestation: Planting trees on steep slopes.

Furthermore, Pitakia and Aaron (2003) reported that farmers in pacific Island countries practiced non- tillage farming techniques. This showed that they normally cleared land which was either done by hand or burning and raised crops with minimum disturbance to the soil. On indigenous method of maintaining soil fertility, Pitakia and Aaron (2003) noted that mixed cropping was one of the frequently used. Mixed cropping entailed growing two or more crops simultaneously on the same piece of land with or without distinct row management. Mixed cropping systems created favorable condition for the soil water, nutrients and provide excellent environmental conservation and sustainability. They also noted that intercropping was a common practice used to maintain soil fertility in Samoa and controlling pests and diseases. He stressed that majority of the farmers in Samoa utilized mix cropping, fallowing, intercropping and mulching to maintain soil fertility. The review above revealed that farmers utilize various IAKP in soil conservation Hence the study will identify the IAKP for integration into NCE Agricultural Education curriculum.

Farmers' Knowledge and Practices in Ethno – Veterinary Medicine

The people of Nigeria as well as many other parts of Africa rely on a wide range of indigenous practices to keep their animals healthy and treat them when they were sick. This traditional animal health care knowledge and practice (ethno-veterinary medicine) include the use of medicinal plants, surgery technique and management practices which had been developed and tested over centuries. Some had withstood the taste of time. Ethno-veterinary knowledge could be distinguished analytically from conventional livestock practices. Ethno-veterinary knowledge informs, guides and were expressed through the practice. Ethno-veterinary medicine was therefore

defined as the study of local knowledge and associated practices, beliefs, practitioners and social structure pertaining to the health care/healthy husbandry of animals. It is the application of local knowledge and practices in raising livestock for the benefit of man. Some ethno-veterinary techniques, such as those used to treat the more widespread ailments are common knowledge among livestock holders. Others however are known only to a few ñindigenous professional ï healersôò Bizimana (1994) contended that African breeders had learned a great deal of animal diseases and tried many kinds of treatment. This knowledge covered nearly all domestic animals and had been passed by word of mouth from generation to generation, part of it being a jealously guarded family secret. Ethno-veterinary medicine was defined by McCorkle (2001) as ñthe holistic, interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners and social structures pertaining to the health care and healthful husbandry of wood, work and other income producing animals always with an eye to practical development applications within livestock production and livelihood systems and with ultimate goal of increasing human well-being via increased benefits from stock raisingò. Stock owners continued to utilize Ethno-Veterinary Medicine (EVM) until better alternatives in terms of efficacy; low cost, availability and ease of administration were found. Tabuti (2003) noted that systematic studies on EVM could be justified for three main reasons; thus; they could generate useful information needed to develop livestock healing practices and methods that were suited to the local environment. EVM could be a key veterinary resource and could add useful new drugs to the pharmacopoeia and can contribute to biodiversity conservation.

According to Bizimana (1994), healersô were of two kinds, just as in modern veterinary medicine: the general practitioners and the specialists. The former was the herdsmen who treated various kinds of diseases by applying common knowledge or belief among herdsmen while the latter (general practitioners or stock raiser or herders) were unsuccessful, they called on the specialists as in the case of difficulty in parturition and embryotomy, for instance in the treatment of fractures.

According to him, healers of animals were usually healers of human too that their knowledge came from their families or other herdsmen described as master herdsmen. IIRR (1996) added that healers are local equivalents of university trained veterinarians. They were repositories of local science that was vital to their communitiesô survival.

In many parts of the world, ethno-veterinary practices had gained prominence. In some parts of Nigeria, modern veterinary assistance was not readily available in many remote areas and hence the people had recourse to home remedy derived from centuries of experience. Stock owners consulted healers who possessed diagnostic and therapeutic skills for many animal health problems that had clear clinical signs. Healers employ herbal preparations and other medicine as well as drug free treatments in the treatment of animals. Many stockholders perceived that traditional veterinary remedies could succeed where modern one failed, particular emphasis was given to ethno-botanicals (Local trees with medical importance) in the treatment of animals were usually native to the local environments and helped the animal to recover on its own/or correct functional abnormality.

Mathias (1996) reported that ethno-veterinary researchers cover the following areas: ethno-veterinary knowledge (which include semantic and taxonomic systems, ethnology and diagnostics and epidemiology), ethno-veterinary practice (pharmacology and toxicology, immunology, surgery, manipulative and mechanical techniques, housing, feeding and watering reproduction and medico-religious practices) and applied areas like technology and environmental topics. Furthermore, traditional livestock veterinary practices included treatment of external injuries, abscesses, ophthalmic disorders, ecto-parasites, gastro-intestinal disorders, reproductive and other related disorders.

Before the advent of western sciences, medicinal practices applied to human beings, animals and plants were probably very similar in all parts of the world (FAO, 2000). The healing art consisted of two major elements that were often used in combination: the application of natural products and

appeal to spiritual forces. Natural products include extracts or concotions from leaves, roots, oils, fats, animal products or insects. Appeals to spiritual force involved incantations, symbols and sacrifices among other rituals such as fire feast for cleansing diseased animals (McCorkle, 2001). These practices were still very common in many cultures throughout the world. The World Health Organization (W.H.O) estimated that 70-80% of peopleôs in developing countries use traditional medicine as a source of health care to animals and plants (including humans) (F.A.O. 2000). Moreover, indigenous people across Africa applied ethno-veterinary measures in the health care and routine management of their stocks. Thus ethno-veterinary practices refer to the wide range of indigenous or traditional animal health care practices (IIRR, 1996). Many of these practices had been developed and tested even in recent times.

There seem to be a large degree of overlap between modern and indigenous veterinary practices. IIRR (1996) reported that many indigenous practices, had close equivalence in modern veterinary practices and that traditional healers recognize the risk of infection, the need for sterilized equipment and the possibility of vaccinating against certain disease. Research had showed that many of the plants used to prepare indigenous medicines contained valuable active ingredients. IIRR further reported that most traditional remedies used by ethno veterinary or traditional healers were locally available and usually cheaper than modern treatments.

There were many ethno-veterinary applications throughout the world. In Congo, there are traditional herbal recipes against mosquitoes, rheumatism, fungal infections, diarrhea, scabies, internal parasites, stomach pains, anemia, bronchitis and diabetes. Also malnutrition in children were treated using the traditional ñSokani floursò (mixture of banana and cereals). Extracts of several plants like tobacco (Nicotiana tabacum) were used to combat pests. In Niger, disease is conceptualized as hot, cold or contagious. Rathmore and Kohter (1999) quoted in Eni (2005) noted that categories ñHotò as applied to livestock refers to contagious diseases such as anthrax, black

quarter etc. More chronic condition such as parasitism or nutrition deficiency falls into the Cold category. In Brazil, the panama vines (Omphaka diadra) were used in the form of decoction to treat skin ulcers and sores. The stem-sap soothes headache and the fruit oil was used for the control of anthelhelminthes (McCorkle, 2001).

Apart from plants, indigenous farmers also knew the particular properties of certain soils and recognized the medicinal values of some soils long ago, though they may not be aware of the exact chemical compounds found in them. They exposed their animals to these soils in order to take in iron which was common in the soils. Indigenous farmers also knew the anti-tumor, antibiotics characteristics of the soils. Community healers applied both plant remedies and soil samples to wound and diseases. Competent bio-pirates made use of these communitiesô knowledge when they go off inventing in the Andes, Also, in Zimbabwe, red soil was used to cure stomach upsets. This soil was known to contain kaolinite (commercial anti-diarrheic drug) (Thorn-miller and Catena, 2001).

McCorkle (2001) further reported that in stokes country and North Carolina; farmers had long prescribed soil rich in iron and iodine for children and young women. This soil was recently discovered to have been used as a famine food for man/his livestock. Furthermore, Thorn-miller and Catena (2001) reported that another marine microbe, Okadiac acid isolated from Gulf of Mexico sponges was useful locally for treating shellfish poisoning. Thus, they concluded that, some world most recent researches into marine life were well founded on indigenous knowledge. For example, cod-liver discovered from the traditional knowledge was used today as a food supplement and medicine for high Vitamin A and D.

In rural Nigeria, there are many opportunities for livestock poisoning. This threat is exacerbated by some factors such as extended dry seasons, frequent drought, overgrazing, nomadic practices, among others. However, most Nigerian agro-pastoralists and indigenous stock raisers were aware of the benefits as well as the dangers of most forage formed in the environment. Ibrahim

(1996) reported that during dry season, stockowners often provide their animals with extra feed in the form of crop residues and cuttings and toppings of wild plants; they carefully select and supply all their herds feed. Also in Nigeria, Hausa and Fulani stock raisers recognized various animals and other organic or inorganic materials as toxic and as such regulate their use in animal feeding. Nigerian agro-pastoralists view only a few plants as toxic and were employed solely as poisons notably those used in warfare, hunting and fishing. In general, rural Nigerians do not generally recognize plants that had cumulative toxic effects as poisonous (Ibrahim, 1996). Indigenous farmers know how to remove a persistent corpus luteum by rectal manipulation. Their knowledge was expressed in the large number of terminology they had in the vocabulary about animal diseases, features and classes of animals. The Fulaniôs for instance, had detailed knowledge of the pharmaceutics properties of most of the plants in their habitats and they used them in remedies against an array of animal diseases, such as constipation, stomach upsets, worm infestations and congestion (Eni, 2005). Furthermore, he reported that the Fulaniôs of the African Sahel distinguished thirty camel diseases and that they resort to a wide variety of procedures to treat these ailments e.g. cauterization and application of wooden splints to broken limbs of animals. McCorkle (2001) reported further that Aramachyan people of the Andes were able to identify the sheep ked (Malophagus ovinus) as their primary parasitic problem that account for great losses in wool production. They use a strong black soap and crushed fresh leaves of a wild plant (Nicotiana paniculate. L) to treat infected animals.

In his report in Cross River State of Nigeria, Eni (2005) noted that indigenous farmers employed curative materials of plants origin in the treatment of worms (De-worming). Indigenous farmers used Butea leaves (Butea frondosa), wild yam (Sapondus trofoliatus) and hot leaves (Occimum africana) to deworm animals by making an infusion or boiled decoction. Hot leaves and paw-paw leaves, *Tephrosa vogellia* and *Ceiba Spp* bark were also used for the same purpose. According to him, ecto parasites were treated by rural farmers by the use of the same curative

materials used in deworming animals like *Tephrosia vogellia*, *Adasoric digitata*, and *Nicotiana robustica*. Eni (2005) reported that curative materials such as the pulp of *Cocos nucifera*, *Vernonia amygdalina*, Pulp of *Eleasis guinensis*, gelatin and ash of marine molusc, *Costus afar*, paste of *Abbysini aoccidentalis* and *Jethropha spp* were used in the treatment of styptics or stoppage of bleeding in animals and humans. In addition, indigenous farmers treat animals by administering curative remedies such as Cathartics/Laxatives. The commonest plants used were Euphorbia *candelabrum*, *Datura stramonium*, *Ziziphus spp*, and *Euphorbia hirta*. Furthermore, curative materials were prepared and used by farmers using their indigenous knowledge to treat fever, pains, convulsion in animals and humans. The materials used for such include; *Adzarltha indica*, *Andropogon citratus*, oil palm seeds, *Magnifera indica*, *Carica papaya*, *Allium cepa*, *Ricinus cuminus* and *Ligenaria vulgaris.* The farmers also used oil palm fruits, *Tamarindus indica, Termimalia tappaca* (Almond tree and Camwood (*Tetrapleura Spp*) as Antivenins and in bone setting.

Eni (2005), equally reported that indigenous farmers treated injuries with *Genus capsicum, Adhatoda vasica* leaves and *Chromonela odorata*, They removed after birth of animal with fresh leaves of *Spondia mumbia* and supply nutrient supplements by giving *Asparayus racemosus* and Aligator pepper leaves. The farmers also treat eye infections by squeezing the leaves of *Aloe spp*, Tomato (Lycopersicum esculentum) and *Newboedia lewis* into the eyes of animals.

Other ethno-veterinary knowledge and practices utilized include the following: Knowledge on semantic and taxonomic system. There are existing vocabularies and taxonomies for types of forages, varieties and classes of animal pests and diseases; (b) Knowledge of epidemiology. Research had found that indigenous farmers had good ethno-epidemiology knowledge. This was revealed on the movement with their animals to avoid disease or incidence of it (McCorkle, 2001); (c) Knowledge of Immunization: Ibrahim (1996) reported that indigenous vaccination mainly centred on those of poxes,

contagious bovine pleuro-pneumonia, ethyma and rinderpest; and (d) Knowledge of Surgery: Traditional surgery procedures found in world include wound care, castration, venipuncture, bleeding, branding and cauterization. Others include: excision of tumor, lancing of abscesses, rumen trocarization and bone setting (Ibrahim, 1996). The literatures on this aspect of the study showed that ethno-veterinary medicine were useful in managing livestock pests and diseases. Hence the study identified ethno-veterinary medicine utilized by farmers in livestock health management.

Documentation of IAKP

Various sources and methods have been suggested by different authors for effective collection and documentation of farmersô indigenous knowledge and practices. Gupta (1990) cited in Sundaramari and Ranganathan (2003) listed the following reasons for documentation of IAK and practices: (a) to understand scientific rationale; (b) to accelerate technological change; (c) to evolve better understanding of technology development and development of newer concepts; (c) to increase awareness among the young generations and develop appreciation for the traditional systems; and (d) to revive and restore pride among the farmers themselves.

According to him, the collection of IAKP could be attempted by many ways like farmersô participatory research and Rapid Rural Appraisal (RRA), which could raise the awareness of rural poverty and associated problems. He stated that Manual Discriminant Analysis is a method that draws upon farmersô own innovative genius. The basic assumption is that by comparing and contrasting the farmersôown practices, a hypothesis would be developed.

According to Dubey, Narainna and Gupta (1993) several techniques like case study method, oral history method, key informant means, making diagrams, case histories, critical incidents, preference ranking and inventing of farmers indicator could be used for eliciting and documenting the knowledge from local farmers. Karfer (1993) pointed out that verbal style of investigation does not

yield satisfactory results always. He argued that observation becomes more important. He further asserted that real insight could be obtained only by prolonged observation.

Rajasekaran (1993) recorded indigenous knowledge systems using farmer participatory methods such as participant observations and unstructured exchanges. Vivkandan (1993) reported that conducting village level workshops, group discussions with farmers, artisans, publication of newsletters in local language for exclusive communication of traditional farm technologies and travelling to interior regions were some of the effective means in identification, documentation and dissemination of traditional technology and means of getting feedback from the people.

Mundy and Compton (1995) stated that sources of indigenous information could be categorized as:

i. Indigenous experts (such as a farmer particularly skilled in raising goats);

ii. Indigenous professionals (such as healers and irrigation specialist);

iii. Innovators (people who experiment with and develop new techniques);

iv. Intermediaries (these who pass on message such as town crier and messengers); and

v. Recipient disseminators (all those who receive information, modify it and pass it on).

Hanyani and Hebnick (1996) reported that the important sources of indigenous knowledge are village elders. International Institute of Rural Reconstruction (IIRR) (1996) recommended the following as sources of indigenous knowledge:

(i) Community members especially the elders;

(ii) Folklore, songs, poetry and theatres;

(iii) Community records like writing, painting and carvings. Records can also consist of trees planted as boundaries, notched poles, bones and many other forms;

(iv) People working with communities such as extension agents; and

(v) Secondary sources include published and unpublished documents, databases, videos, photos, museums and exhibits.

The following methods had been suggested by IIRR (1996) for recording indigenous knowledge in communities; identifying indigenous specialists, case studies, field observation in depth interviews, surveys, brain storming, games, group discussions, role play, SWOT analysis, village reflections, village workshop, flow chart, mapping, taxonomies, participatory video and photo/slide documentation. IIRR further reported that indigenous knowledge could be documented in the form of descriptive texts such as reports, taxonomies, inventories, maps, matrices, decision trees, audio visuals such as photos, films, videos or audio cassettes, dramas, stories, songs, drawings, seasonal pattern charts, daily calendars etc. Indigenous knowledge could also be stored in local communitiesô databases, card catalogues, books, journals and other written documents, audio-visuals museums and so on.

Kanagasabapathi (1996) concluded that the methods like participant observation, individual and group interviews, field observations, joint interactions, preference ranking, case histories and critical incidents/ methods play a vital role in documenting indigenous practices. The study identified and documented indigenous Agricultural Knowledge and Practices utilized by farmers in crop and livestock production, soil conservation and ethno-veterinary medicine. The study adopted Rapid Rural Appraisal and descriptive survey design which elicited information from farmers.

Agricultural Education Programmes in Nigeria

Agricultural Education is a process of imparting knowledge, skills and attitude in agriculture to the learner at any level. It is the type of education that is employed in training the learner in the improved agricultural production, processes, as well as in the technique for the teaching of Agriculture (Egbule, 2002). Agricultural Education as defined by Olaitan (1988) is a type of education for training people in the art of farming and also in the pedagogy of agriculture. He contended that Agricultural Education should provide information, knowledge and research for initiating not only students but also retired workers into agriculture as well as assist in improving the

skilled farmers in farming through short training programmes. According to Osinem (2008), Agricultural Education is a process of imparting agricultural knowledge, skills and attitudes to learners (young and adults) for the purpose of expanding agricultural activities. It is a process of educating students in various skills of Agriculture either in Primary, Secondary, Farm School, Farm Centre, College of Agriculture and Universities. Egbule (2002) asserted that in schools, agricultural education refers to the teaching of skills, values, attitudes and related knowledge in production, processing and marketing of agricultural related products. He emphasized that in such schools; students were expected to carry on short and long term practical activities and projects such as cultivation of crops, vegetables and fruits, raising of livestock for the schools consumption and for local markets. The students also learned to undertake improvement projects to increase the value and efficiency in their farms keep records, as well as grade, process and market their produce.

Osinem (2008) asserted that Agricultural Education provides learners with sound academic knowledge and skills as well as ample opportunity to apply this knowledge through classroom activities, laboratory experiments, project participation and supervised agricultural experiences. Agricultural Education emphasizes skill development in all aspects of agribusiness such as planning, management, safety, finances and leadership. It also furnishes learners with the necessary communication and interpersonal skills as well as knowledge of technical agriculture to would be teachers at all levels. It equips learners to be self employed or work in agricultural extension services and foreign agencies.

Agricultural education deals with methodology of agriculture, i.e. how it should be taught; field-trip, excursion, lecture and demonstrations among others. In fact, Agricultural Education focuses on the totality of how to impart necessary knowledge and skills to the learners to make them useful members of the society. Agricultural Education also deals with the training of pre-service teachers and re-training of in-service teachers of agriculture. Federal Government of Nigeria (FGN,

2004) in its National Policy on Education (NPE) charged Educational institutions with the duty of producing adequate numbers and quality of teachers in all field including agriculture whose services will:

1. produce highly motivated, conscientious and efficient classroom teachers for all levels of our educational system;
2. encourage further the spirit of enquiry and creativity in teachers;
3. help teachers to fit into social life of the community and the society at large and enhance their commitment to national goal;
4. provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situation; and
5. enhance teachers commitment to the teaching profession.

The institutions that were trusted with the required professional training of teachers in agriculture (provided they continuously meet the required minimum standard) include:

a. Colleges of Education;
b. Faculties of Education;
c. Institutes of Education;
d. National Teachers Institute; and
e. Schools of Education in the Polytechnics and Colleges of Technology.

Importance/Role of Agricultural Education

According to Osinem (2008), Egbule (2002), and Olaitan (1984), Agricultural Education has an essential role to play in reversing the falling social and economic status of agriculture. This could be achieved by the following means:

1. Providing young people with sound knowledge, skills and creative abilities with which they could translate this knowledge into real improvements in agricultural productivity;

2. Preserving those aspects of the culture which are in keeping with modern farming methods while changing those which were obsolete. In this way, it would help rural community to adjust to what was effectively a revolution in agriculture;
3. Providing farmers with the knowledge upon which to base their production decisions. For example, how to react to fluctuations in product prices and select the enterprise best suited to his land, it would be able to teach farmers the principles of harmonious property relations in the use of agricultural resources so that farmers could then pool the ownership and operation of adjoining land for greater production;
4. Helping rural farmers to develop an understanding of the inter - relationships of urban and rural life and provide counseling about agricultural occupations and the means of preparing for them;
5. Providing training for specialist in agricultural occupations such as livestock and plant breeding, food storage and processing and also agricultural financing and insurance to help reduce uncertainties for those producing food in the future;
6. Producing more trained personnel involved in extension services for farmers, translating research findings into field trials prior to commercial applications;
7. Producing graduates who will wish to remain in an academic environment ï either in research or in teaching from elementary through to college level; and
8. Develop problem ï solving and safety practices on students and other agricultural practitioners.

Olaitan (1984) reported that the benefits of Agricultural Education were far ï reaching, potentially influencing all facets of rural life to result in a marked improvement in the economic status of agriculture. The resulting increase in standards of living, schools and a richer cultural life

would help to stem declining rural population by attracting young people in search of a satisfying way of life.

Systems of Agricultural Education in Nigeria

Different forms of Agricultural Education in Nigeria are found in Primary Schools, Secondary Schools, Teacher Training Colleges, colleges of Agriculture and Universities. Agricultural Education as a course of study in Primary schools originated as rural education in the early thirties. During that time, many schools were said to have farms and gardens, there was little attempt to coordinate the programme or give functional approach. At the moment, many Primary Schools in Nigeria especially those in the rural areas, have programmes for training primary school pupils in modern methods of agriculture as a course of study. The teaching of agriculture as stated by Osinem (2008) is aimed at achieving the following objectives: (a) To develop in the school children a positive attitude and interest in agriculture and appreciation for the problem involved; (b) To expose primary school pupils to methods in Agriculture; (c) To develop an understanding and appreciation of agriculture as a vocational as well as avocational interest; (d) To develop an understanding of the contribution of agriculture to the economy of the country and the community; (e) To develop the interest of pupils in creative activities; and (f) To enable the pupils to appreciate and interpret their environment in a scientific way.

The Agricultural Education programme in primary school does not give proper orientation to young ones. There is not much of agriculture as a subject taught under the classroom setting. Prior to the Nigerian independence, a form of Agricultural Science was concentrated more in Primary Schools as the colonial education regarded agriculture as too prestigious for the Secondary level education. Agriculture was mainly reserved for Post-secondary Institutions, namely; the Schools of Agriculture and the Universities.

However, with the inception of the Advanced Teachers College (ATC), the education policy makers came to the realization that agriculture could be an important subject to be taught at Secondary School level. In order to implement this policy, well trained Agriculture teachers were to be produced. The ATC were thus charged with this responsibility. Those studying Agricultural Education were required to have a good knowledge in areas of biological and physical sciences. Agriculture, therefore, became an important school subject after graduation of the first NCE students in Agricultural Science in the early 60ôs (Okorie, 2001).

As the Government realized the importance of Agricultural Education in Secondary Schools, a great deal of prominence was given to the study of the subject in the 6-3-3-4 system of education. Agriculture was made a core subject in both the Junior and Senior Secondary School curriculum. Specifically, the broad objectives of Agricultural Education at the Secondary School level include the following:

a. To stimulate and sustain students interest in agriculture;
b. To enable students acquire basic knowledge and practical skills in agriculture;
c. To enable students integrate knowledge with skills in agriculture;
d. To prepare and expose students to occupations and opportunities in the field of agriculture; and
e. To prepare students for further studies in agriculture.

In order to achieve these objectives, the curriculum content of the Senior Secondary level was made to consist of the three major concepts of production, protection, and economics. Topics related to these concepts were organized into six units; namely: basic concepts, crop production, animal production, agricultural ecology and systems, agricultural engineering, agricultural economics and extension. The spiral approach was adopted in the presentation of topics, across the Senior Secondary School years. The Senior Secondary Programme related directly to the Junior Secondary School

(JSS) programme such that concepts introduced at the JSS are further dealt with at senior secondary level to produce a graduated development of concepts and enhance the learning and comprehension of students. Learning by doing is emphasized in the curriculum so that students should be able to produce food and other agricultural products, for themselves and their community. A series of activities suggested in the curriculum is designed to ensure the development of psychomotor skills in agriculture by the students. The programme further recommended that: (a) each student be guaranteed adequate equipment, farm space, farm structures and regular supply of fertilizers and animal feeds; (b) In addition to having a farm, each student should keep at least two farm animals; (c) Students achievement should be continuously assessed through various forms of test and during field and laboratory practical; and (d) Individual assessment should be carried out for activities in crop production while group assessment should be restricted to perform in animal production activities.

Agriculture is studied in Teacher Training Colleges in Nigeria. The goal of Agricultural Education at this level was to develop within the students the professional and technical competencies needed to function effectively as a teacher of primary school agriculture. However, in order to achieve this goal, some measurable and specific objectives had to be achieved. They include: (a) to generate a commitment to the teaching of agriculture; (b) To develop positive attitude towards agriculture and agricultural related occupations; (c) To develop methods and techniques which are effective for teaching primary school agriculture; and To develop understanding and skill of agricultural subject matter which are congruent with the needs and age level of primary school pupils.

Agriculture as a subject consisted mostly of such areas as general agriculture, crop production, horticulture, animal husbandry, soil science, farm management, farm mechanics and forestry. As aim was to train an effective cadre of teachers for primary school agriculture, sufficient emphasis was placed on both theory and practical teaching.

Agricultural Education in Tertiary Institutions

Tertiary level of education is the education given after secondary education in Universities, Colleges of Education, Polytechnics, Monotechnics including the institutions offering correspondence courses (FGN, 2004). The Ashby Commission Report (1959) made an important landmark in the development of Agricultural Education in Tertiary Institutions in the country. This was evident in the production of graduates from the Universities who are specialized in one field of agriculture to another. However, there are few Universities in the country with the Departments of Agricultural Education whose primary objective is the training of students for teaching and leadership position in Secondary Schools as well as in other institutions of higher learning. Agricultural Education in relation to the aforementioned objective was initiated in 1962 by the Department of Vocational Teacher Education, University of Nigeria Nsukka (Okorie, 2001). The students who enrolled in the programme took courses in various faculties, of education and agriculture; hence Agricultural Education students were well informed about the fundamentals of agriculture. Similarly, they possess sufficient knowledge in different areas of education and are therefore most qualified as teachers of agriculture.

The major aim of Agricultural Education programmes in tertiary institutions was to prepare teachers for Secondary Schools or grade II Teacher Training institutions. The Agricultural Education syllabus at this level had the overall practical objectives to ensure that each teacher/student was able to explain the principle of Agricultural Education and demonstrate the skills and other abilities directly related to the job that is to be done following the institutionôs policy. Tertiary institutions aim to sustain and improve its provision of education in agriculture and sciences. The provision was designed to enable access to knowledge and to develop both an analytical questioning approach and the abilities to access information and reach decision. The aim also was to provide graduates who

were able to work confidently at home or abroad and who would independently apply their skills to new situations.

Agricultural Education programme at tertiary institutions apart from training students as competent teachers also had the secondary aim of preparing all the students for further academic studies. Osinem (2008) and Olaitan (1981) noted objectives of agricultural education at this level to include: (a) ensuring that the students acquire adequate knowledge and skills in all the areas included in agricultural field of study; (b) producing teachers who are able to apply the principles and skills of agricultural education to the needs of individuals, homes and family life in Nigeria society; (c) instilling in the students an awareness of the rapid expansion of knowledge and willingness to experiment the new ideas and practices for the improvement of the field; (d) promoting desirable attitudes in the students and to develop teaching skills and abilities; (e) developing in the teacher an awareness of her responsibilities and duties as a leader and innovator in the community in which she lives and works; (f) encouraging real desire among the students to become farmers; (g) encouraging the habits of observation and a scientific approach to solving problems; (h) developing a strong sense of both individual and collective responsibility; (i) incorporating in the technical training of a sound general education; (j) understanding and gain knowledge of the sciences that underpin -agriculture and production systems; (k) training young secondary school leavers as agricultural assistants and superintendents thus forming group of extension agents whose responsibilities lie in carrying research findings to farmers in rural areas; (l) becoming actively involved in the research unit, laboratories and developed into high quality employable graduates; (m) developing skills in science, information and communication technology, team work, self management and problem solving; and (n) developing a greater practical knowledge of the technological aspect of Agriculture.

In seeking to achieve the above objectives, it was considered essential that every member of the staff was convinced that farming could be made to offer a really worth-while career, and that this

belief was exemplified in all that staff members involved the in practical farm work. Students require to be taught practical skills and help them until they master them.

Agricultural Education Programme in Colleges of Education

Presently in Nigeria, most Colleges of Education offer Agricultural Education programmes in their curricula. These programmes, according to Egbule (2002) were drawn from the broad objectives of the larger society, so as to achieve the agricultural and economic policies of Nigeria. The programmes were run for three years at the end of which students were awarded the Nigeria Certificate in Education, (NCE).

The philosophy of Nigeria Certificate in Education (Agricultural Education) programme is tied to the national philosophy on agriculture for self reliance based on the provision of teachers endowed with a balance approach between principles and practice of agriculture for academic and vocational ends. The Agricultural Education programme which was recently reviewed in 2009 by the National Commission for Colleges of Education (NCCE) was geared towards achieving the following objectives;

i. to prepare graduates with the right attitude to, and knowledge/professional competence in vocational agriculture:
ii. to produce teachers who will be capable of motivating students to acquire interest and aptitude for agriculture;
iii. to develop in the student ï teachers the appropriate communication skills for effective transmission of agricultural information to the students in the context of their environment;
iv. to equip the student: teachers with adequate knowledge and ability to establish and mange a model farm effectively; and
v. to provide a sound background to enhance further academic and professional progression of the student teacher (NCCE, 2009).

Since agriculture teachers who would teach Agricultural Science in basic (Primary and Secondary) schools are produced in the Colleges of Education, integrating IAKP in their curriculum would help to produce teachers who would transmit IAKP to younger generation thereby bridging the gap in information sharing in agriculture.

Selecting Curriculum Objectives in Agricultural Education

Curriculum objective is a statement of expectations or outcomes. According to Wheeler (1981), one of the major difficulties of the curriculum process is the transmission from general aims to the particular objective of the classroom. In order to achieve this according to Wheeler (1981), three step processes are necessary: the ultimate goals must be stated, ultimate goals derived and finally proximate goals set up so that specific objectives could be planned in the classroom. Ultimate goals are the expected outcomes expressed as patterns or categories of behaviour. They are the expected end-products of an education carried out overtime. They are statements of desirable acts, feelings, attitudes and knowledge integrated in a pattern and exhibited in appropriate situations. Mediate goals are statements of behaviour expected of the learner at the end of each stage of education. Proximate goals are the most specific statements of intended behavioural outcomes possible in phase one of curriculum process which is the selection of curriculum objectives. They are specific but not discrete since they are liked to other types of goals. They are goals to be accomplished at the end of a courses work or a unit of work.

According to Offorma (2002), specific objectives are stated statements of behavioural expectations of the learners at the end of each learning sequence. They are also called instructional objectives since they are classroom objectives. Specific objective are also behavioural objectives because they specify the actual student behaviour at the end of an instruction. In Agricultural teaching, action verbs are used to express specific objectives. For example, at the end of the lesson, the students will be able to draw and label correctly the mammalian digestive system.

The selection of curriculum objectives is the primary phase in curriculum planning. All other phases depend largely on the content of the statements of objectives. Offorma (2002) identified the major functions of educational objectives as:

i. Providing an orientation to the main emphasis in educational programs. Thus educational objectives are used to translate the philosophy into values, needs and aspirations of the society;

ii. Curriculum objectives help the curriculum planner to select content, learning experiences, resources, methods and evaluation procedures. All these are related to objectives because at each stage, the focus is on achieving the stated objectives;

iii. In dealing with learning experiences, the stated objectives help in choosing the activities or experiences. Since active participation of the learners in learning activities facilitates the achievement of the objectives, it then follows that the activities to be presented to the learners must conform to the objectives. The case is the same with selection of resource materials to implement the lesson. The objective determines the type, quantity and quality of resource materials needed to affect learning. The objectives also help in determining the most appropriate method to be employed in a lesson. The scope of the objectives is borne in mind while thinking of the method. The nature of the objectives may demand a combination of methods;

iv. For evaluation, the objectives are evaluated. Evaluation entails collecting information on how the objectives have been achieved. This implies that objectives determine the evaluation procedure and content. The main purpose of objective is to guide in making curriculum decisions on what to teach how to teach, what areas to emphasize and what to evaluate. So in the context of this study, curriculum objective of IAKP will be a guide to what to teach, how to teach and what to evaluate for integration.

Selecting Content in Agricultural Education

Content in agriculture according to Osinem (2008) is described as the knowledge, skills, attitudes and values to be learned. They are facts or topics which make up the subject taught to learners. According to him, content in agriculture as those agricultural and farming related facts, observations, data, perceptions, discernments, sensibilities, designs and solutions drawn from what the mind of individuals have comprehended from accumulated farming experiences and those constructs of the mind that reorganize and rearrange those products of experience into core ideas, concepts generalizations, principles, plans and solutions. The above definition showed that content in agricultural education is related to the three behavioural domains which must be acquired by the learner so as to be an all round educated person. Knowledge, ideas, facts, concepts and principles are related to cognitive behaviour while skills are psychomotor behaviour and values, attitude, sensibilities are affective behaviour. The three behaviours must be involved for education to be functional. The content of a course in Agricultural Education is logically arranged for instructional convenience of the teacher and pupils.

Osinem, (2008) Offorma (2002) and Mkpa, (1987) outlined the factors that determine the selection of content in Agricultural education which include:

i. Need of the society: The society comprises of people who are organized into distinct groups. The role of education in the society is to transmit its culture to succeeding generations and facilitates the socialization of the individuals in the society. Content of a course should focus on the need of the society of which the course is designed. This is in line with the present study which aimed at transmitting IAKP to the younger generation;
ii. Age, development and maturation of the learners: It is good to select content of a course in agriculture considering the age and maturation of the learner. Also, there is need for variety in the ways in which content is made available and in the manner in which students are expected

to learn it, that is, content must be designed and selected in such a way that student with different abilities and experiences will be accommodated;

iii. Pupilsô entry behaviour: Course content should be designed based on the studentsô previous knowledge of the course or related courses. It is necessary to relate new content to what the students already know. This will facilitate learning, save time and teachers job become less burdensome;

iv. Competence of the teacher: The course content must be selected and designed within the competence of the teacher who will handle it. The teacher must be ready to handle the course based on skills and experiences about the content;

v. Availability of facilities and equipment: The facilities needed for the course must be available or must be within reach in the environment. These facilities and the equipment should be the replica to the ones they will meet at real work environment. It should also be one that will facilitates the transfer of learning and promote entrepreneurial behaviour. The content to be integrated include: knowledge, attitude and skills to be learned as they relate to IAKP.

Methods of Teaching in Agricultural Education

An effective teaching requires skilful teachers to use many different methods of teaching at his/her disposal, but carefully designed teaching method could work wonders in making teaching effective (Osinem, 2008). Giachino and Gallington (1967) cited in Egbule (2002) summarized some basic principles of learning and they had to be borne in mind when choosing a particular teaching method. These principles include:

1. Learning takes place more readily when we are ready to learn, or when the desire or purpose to learn is strong;
2. Learning is made simpler when what we are currently learning is built on something we already know;

3. Learning is more effective when we apply or practice what we learn;
4. The most effective learning results when there is immediate application of what is taught;
5. Motivation and interest are necessary for effective learning; and
6. Learning is more likely to take place if students have a reasonable chance of achieving early success in their endeavours.

Egbule (2002) stated the criteria that should be meet in selecting a particular teaching method: they include:

i. It should be suitable to achieve the spelt out objectives;
ii. It should afford both the teacher and the learner the opportunity to practice the behaviour spelt out in the objective;
iii. It should be within the range of ability and experience of the learners;
iv. It should be adapted to the need, problems, maturity and interest of learners;
v. It should afford the teacher an opportunity to observe pupils progress;
vi. It should provide for individual difference among students; and
vii. It should be possible to achieve the objectives relative to time for the lesson, size of class, facilities available and competency of the teacher.

A variety of teaching methods could be adopted to make the teaching of agriculture effective. These include the following:

Lecture Method: Egbule (2002) defined lecture method as verbal presentation of subject matter by teachers to students. Olaitan (1984) described lecture method as an instructional technique by which the teacher seek to create interest, influence, stimulate, or mould opinion to promote activity, impart information or develop critical thinking, mainly by use of lectures, with minimum class participation. A minimum number of related teaching aids are used to supplement the lecture. Osinem (2008) stated that lecture as one of teaching methods is currently in use in tertiary institutions and also adult

learning conditions. When lecture method is used, the teacher is the active participant while the students are passive and hence the teacher as the lecturer benefits more than students. Lecture method is time saving, enables the teacher to present ideas to a large number of pupils at a time and makes it possible for the teacher to give details of the topic at each point in time. However, during lectures, learners are passive listeners and so little knowledge is gained, little or no provision are made for meeting individual needs and does not provide opportunity for learners to think, research or to adopt a problem solving approach.

Discussion Method: This involves a group of people or a class who gather together in order to exchange ideas, facts and opinions orally about a topic of mutual concern and interest (Olaitan, 1984). Egbule (2002) noted that discussion method involve group interaction whereby individuals take turn to express their ideas or opinion on a particular topic or concept under the direction of the teacher. The teacher acts as the leader and directs ideas and information produced by the pupils in the class. He listens to what is said by each individual pupil in the group as this give insight into his level of knowledge and understanding of subject matter. Osinem (2008) reported that every student is suppose to have background information that would enable him express his view points, ask questions and also answer questions during discussion. Discussion method of teaching agriculture has advantages of enabling students to sharpen their cognitive skills, promote learning as discussed topics are not easily forgotten, promotes healthy group interaction and helps to build desirable attitudes. However, the focus of the discussion may be lost if not properly directed, it is time consuming and discussion method may not be effectively used to teach certain topics.

Problem Solving Discovery Method: This is an attempt to discover the route to a goal, in the light of past experience and in a manner appropriate to the present situation (Olaitan, 1984). According to Osinem (2008), problem ï solving approach consist of identifying and selecting problems growing out of the experience of individual student or learners, presentation of the problems before the

learners and guiding them in finding solution. Problem solving employs scientific methodology. The focus is on obtaining useful knowledge through problem solving thereby discovering better ways of doing things. According to Egbule (2002), problem solving contributes to the development of reflective thinking, creative expression, critical analysis and logical reasoning. In addition, it stimulates interest, enables students make rational decisions and have real sense of satisfaction after arriving at a reasonable solution to a problem. Osinem (2008) stated that the following steps must be followed in using problem solving approach:

(a) Identification of problems or issues which require answers or solutions by the students;

(b) Definition and delimitation of problems, collection of data and other evidences that may help solve the problem;

(c) Formation of hypothesis for the solution to the problem;

(d) Use of formulated hypothesis; and

(e) Checking of results and if the solutions is supported then the problem is solved but if otherwise the process is repeated.

In solving problems, the teacher should be careful not to solve the problem for the students but try to guide them through questions and other methods relevant to the problems solving approach. Good problems for individual or class consideration should meet the following criteria: (a) they should be simply, clearly and unambiguously stated; (b) they should have proper scope and focus; (c) they must be of interest to the student; (d) they should challenge intellectual, mental and physical abilities of students (e) they should provide valuable benefit with respect to application to future individual and group problem; and (f) they should be adaptable to the instructional situation.

Demonstration Method

Demonstration is the basic method for introducing new skills to the learner. Ogwo and Oranu (2006) defined demonstration as any planned performance by a teacher on an occupational

skill/information aimed at explaining the steps/facts of an operation/principle. In essence, a demonstration is aimed at showing how a process, procedure or experiment is to be carried out. It shows the student what to do and why it is done that way. Practically, everything in Agricultural Education challenges the teacher to provide effective demonstration to facilitate studentsô understanding. According to Ogwo and Oranu (2006), the two most important sense organs that come into play in communication are those of sight and hearing. When a teacher demonstrates before a class or a single learner, these two senses are made full use of most frequently; in particular, the sense of sight is utilized to a very large extent during the process of learning and thus accounts for approximately 75 percent of what the learner absorbs mentally. Hearing accounts for only about 13 percent of learning. In another rating by Kindler (1973) cited in Ogwo and Oranu (2006) people use their senses for learning in these proportions:

10% of what they read

20% of what they hear

30% of what they see

50% of what they hear and see

70% of what they say as they do a thing.

The demonstration method of teaching may be used in a variety of ways by itself and in combination with other methods. A demonstration is useful in illustrating an activity such as planting of garden egg plant. One advantage of demonstrations is that they provide opportunity for student participation. Students enjoy and understand a lesson more if they are actively involved as oppose to being passive spectators and this is consistent with the Chinese educational

paradigm: I hear, I forget
I see, I remember
I do, I understand.

Osinem (2008) and Olaitan (1984) outlined three types of demonstration which include:

i. Class Demonstration;

ii. Group Demonstration; and

iii. Individual Demonstration

Class Demonstration: This method is used with the students in or outside the class since it involves the entire class, so the teacherôs time is saved as there will be no cause for some students to bother the teacher to repeat the procedure or to give them basic information. The entire class members are actively involved in watching the teacher and asking questions on some points not possibly clear to them.

Group Demonstration: The difference between class and group demonstration is that group demonstration is presented to a section of the class while the rest of the class is engaged in another assignment that may or may not be related to the topic under demonstration. Some factors such as individual differences in background, mental ability in hearing, seeing and so on demand group demonstration for the success of the teacher.

Individual Demonstration: The use of this method arises as a result of individual differences in background, mechanical aptitude and general learning ability, irregularity in attendance and other peculiarities of the learners, hence the need for individual demonstration.

Ogwo and Oranu (2006) gave suggestions for effective demonstration in teaching vocational education courses. These include:

1. Before conducting any demonstration in the class, the teacher should have clearly in mind what he/she wishes to demonstrate and how this will promote the successful realization of the lesson objectives;
2. All machines, equipment, tools, drawings, charts etc .necessary for the demonstration should be well arranged and kept in good condition to insure a smooth uninterrupted demonstration;

3. Students observing the demonstration should be physically comfortable and able to observe the instructors demonstration;
4. All sources of distraction should be removed;
5. Full explanation of what the teacher is demonstrating should always be given;
6. The demonstration should be slow enough to enable the students to grasp the skills inherent in the procedure. There should be intervals for questions and answers involving both the teacher and students; and
7. If a teacher cannot demonstrate particular skill, an experienced outsider may be called upon to perform.

Field Trip

This is a planned visit to places outside the regular classroom to obtain information directly and study real situations. Osinem (2008) stated that field trip or visit usually become necessary due to the fact that most subject syllabuses do suggest that certain units or topics are best taught by taking the students on a trip to the field. Field trip is used as a supplement to the regular classroom and laboratory instruction. Olaitan (1984) noted that field trip could be used to develop critical thinking and broaden the horizons of the pupils as they see people work in different activities. Egbule (2002) outlined the guidelines for effective field trip. They include:

i. Select the place to be visited with students;
ii. Let the school authority/institution know about the trip;
iii. Write or contact the organization to be visited by stating the number of students to be involved and convenient ï date for the trip and possible accommodation if the trip is to last more than one day;
iv. Solicit for support from the school/institutions in the form of vehicles to convey students;

v. Brief the students properly on their mode of dressing conduct and possible items to travel wit;.

vi. Ensure that the vehicle for the trip is properly services and checked;

vii. Set off on time;

viii. Warn drivers against alcoholism and reckless driving;

ix. Prior to take ï off, students should be told the purpose of the trip, what they are expected to observe and learn;

x. Ensure that an employee of the establishment is at hand to receive and take the students round on arrival at the establishment;

xi. Mix up freely with students as they are taken round and point out and draw studentsô attention to important points or processes; and

xii. After the visit, write and thank the establishment for their reception and opportunity given students to visit their establishment.

Project Method: Project is percieved as a natural, life like activity involving the investigation and solving of problems by an individual or small group. According to Osinem (2008), it is a teaching method where students are grouped in order to work as a group on a particular topic of interest. The students are given various projects to be carried out within a time frame and guideline on how to carry out such a project. In order to obtain maximum value from the project, Olaitan (1984) stated that the teacher should merely guide and co-ordinate the work and let the pupil do the rest. The project method helps to hold interest and motivate the study of technical facts and related knowledge in agriculture. Projects are most satiable for pupils who are not only inquisitive but also creative and interested in immediate outcome of their activities. In agriculture, projects could be organized in crop production techniques, livestock management, co-operatives and processing of crops such as cassava,

oil palm and yam flour. Olaitan (1984) emphasized that projects have several advantages over other teaching methods in that:

1. The project method offers a normal organizing centre for acquisition of new skills and facts;
2. The project method is a means of holding interest and testing aptitude in agricultural, technical, business and home economics, because it involves the pupilsô independent through and action supervised by the teacher and exposes the pupils to a realistic work situation; and
3. The project method is most useful in developing modes of thought, procedure and characteristics for the occupation.

On the other hand, project work is not easy to organize. It requires the technical and organizational competence of the teacher for its success and it takes a long time to prepare and carryout. It requires special supervision to hold the interest of the pupils.

Workshop Method: Workshop method or supervised practice involves groups of people under the supervision of the teacher learning to improve individual proficiency or skills or to solve a problem or extend their knowledge of a subject. Olaitan (1984) and Osinem (2008) emphasized that effective use of workshop methods depends on adequate preparation, presentation and evaluation. According to them, the steps or procedures in organizing workshop as a method of teaching agriculture which include:

1. Prepare the workshop with all the necessary equipment making sure that all pupils have enough space to work comfortably and can be supervised by the minimum number of staff;
2. Prepare job operation sheets for the pupils and hand them out before the practice session;
3. Explain the relevance and the necessity of workshop practice to the pupils and emphasize the safety procedures that should be observed;

4. Allow all the pupils to practice. Constant supervision must be maintained although it may be impossible to supervise each pupil individually. Bad practices should be corrected as soon as they occur;
5. After the pupils have mastered the basic skills, it is desirable to involve them in realistic project to stimulate and motivate them;
6. Each pupil should be tested or examined at the end of the practice session. The pupils should be able to perform the tasks efficiently on which practice is given and such evaluation should provide feedback to the teacher so that he can estimate if additional practice is needed; and
7. If the skill being practiced is a pre-requisite to a more complex job being studied, it is necessary to master the initial skill before learning the complex one.

Task Instruction Sheets (TIS)

Task Instruction Sheets (TIS) according to Osinem (2008) can be described as a teaching method peculiar to vocational or skills subject where necessary steps for accomplishing a given task are pointed on paper and distributed to students to study within a given period which is normally followed by demonstration of the task where the materials and equipment are available and/or mere clarifications from the teacher before the students are evaluated. It is written instruction or guide on how to accomplish a task thereby minimizing teachers talking syndrome. Task instruction sheet are prepared and served to each student so that both slow and fast learners can get accurate details of how to perform the task under study. The use of TIS alongside the lesson plan leaves all categories of student in a typical inclusive class with accurate notes of lesson for reference purpose. Osinem (2008) and Olaitan (1997) stated that in a situation where the right environment (materials and equipment) are available to perform the task described in the instruction sheets, it will follow immediately, otherwise, the students are given assignment based on task description provided to the TIS.

In preparation of TIS, Osinem (2008) maintained that the production starts with task identification which is followed by task analysis. He stated that task analysis involves developing a list of tasks that are usually performed by people practicing a given occupation in an attempt to get work done. Task analysis involves identifying classes of behaviour expected to be performed by a student. The implication is that it is through task analysis that work is broken down into component part Task analysis has long served as a primary means of dividing instructional content for occupation. Osinem (2008) outlined the general guideline for developing TIS; thus:

(a) Identification of task;

(b) Identification of task objectives (to reflect only in the teacherôs lesion plan);

(c) Introduction of task to be performed;

(d) Listing of materials and equipment required to perform the task;

(e) Listing instructions to be followed sequentially to get the task done;

(f) Task demonstration by teacher and trials by students;

(g) Indicating assignments which can be detached from the task instruction; and

(h) Task performance evaluation.

Teaching methods are the ways instructions are presented by the teacher. They are various ways employed by the teacher to carryout teaching activities. They are orderly procedures used by the teacher to direct learners in developing skills, attitudes, habits and knowledge. In the context of this study, teaching methods deals with ways in which information will be presented to students on IAK and practices. This will help the teacher in arranging the subject matter so that it can be effectively used by the learner.

Evaluation in Agricultural Education

Evaluation has been defined in a variety of ways by people. To the teacher and student, evaluation may be regarded as a means of grading while to others, evaluation is synonymous with

educational measurement or assessment. According to Offorma (2002), evaluation is the process of finding out the strength and weaknesses of the whole curriculum endeavour. It is regarded as the means of finding out what the students have learned and what they have not learned or what gaps remain in their learning endeavours which must be closed for learning to be achieved. Evaluation is the process by which relevant data are collected and transformed into information for decision making. Evaluation can also be seen as the process of delineating, obtaining and providing useful information for judging decision alternatives. Okoro (2002) defined evaluation as the appraisal of the worth or value of a thing or action and the making of appropriate decision on the basis of such appraisal. Okpala (1993) viewed evaluation as the process of gathering valid information on the attainment of educational objectives, analyzing and fashioning information to aid judgment on the effectiveness of teaching of educational programme. Also, Olaitan (2003) defined evaluation as the process of obtaining information on what one is doing towards achieving an objective, how far one could go on achieving the objective and constraints hindering the achievement of the objectives and also what one could do to overcome the constraints of achieving the objectives.

According to Osinem (2008), evaluation is a qualitative judgment that one makes about people or thing as a result of their performance on a certain pre-determined criteria. He went further to state that evaluation is a process of making value judgment or making decisions about events, objects or their characteristics. Evaluation is not the same thing as measurement. For example, while measurement talks of raw scores of the student, evaluation concerns itself with judgment by using such world as ôexcellentô, ôvery goodô ôgoodô, ôfairly goodô ôpassô ôfailô etc. based on the raw score. Measurement involves testing and use of different instruments to systematically assign numbers, scores or ratings to studentsô behaviours or instructional methods or agricultural programme.

Assessment is the validation of the teachersô classroom actions and the learning that takes place there. Assessment is designed to determine the extent of the performance of a student in a unit

of instruction or the overall progress of a student in the school up to a particular point in time. So in the context of this study, evaluation entails the extent to which the stated objective of IAKP have been achieved which involves measurement and assessment of individual performance on the learning situation task.

Osinem (2008) and Olaitan (1984), represented evaluation in Agricultural Education into two namely;

i. Instructional evaluation

ii. Programme (curriculum evaluation)

Instructional Evaluation: Instructional evaluation according to Osinem (2008) is the process by which the teacher or instructor makes use of certain techniques to find out whether the learner has actually captured what is taught. The teacher is always anxious to know how much the stated objectives of an instruction the learner have achieved. He does this through the instrumentality of essay type tests, multiple choice test items and performance ï based test using observational techniques. The teacher can use several instructional evaluation methods to assess studentsô cognition. These include placement evaluation, formative evaluation, diagnostic evaluation and summative evaluation.

Programme (Curriculum) Evaluation

This is the type of evaluation that provides periodic feedback on the extent to which the set goals of a school programme or projects are being achieved. Osinem (2008) stated that the school agriculture programme of an institution could be evaluated by determining whether the facilities for the realization of the desired objectives are available in the school or not. He went further to state that other things to be evaluated include the opportunity for interaction between students and the farming community such as field trip and participation in community events; and also the method of interaction adopted by the Agricultural Science Teachers and to what extent the preferred method are

utilized by the teachers. For a programme to be fully evaluated in Agricultural Education, it must pass through the following sequence according to Stufflebeanôs evaluation modelï : Context evaluation, input evaluation, process evaluation and product evaluation (CIPP).

Context evaluation is fundamental to the effective implementation of a programme as it provides criteria for decision during programme operations and for judging product utility. Input evaluation is a technique which provides information on the resource available for executing a programme and how they could be utilized to attain a desired goal. Process evaluation is concerned with procedures for designing programmes. It is also concerned with whether or not a programme or course is being implemented as originally planned. Product evaluation is systematic evaluation of the attainment of objectives which are pre-requisites to entering another stage of the programme or attainment of the ultimate programme objectives. It aims at determining the degree to which the intended programme objectives and goals were met. It must be noted that the central concept of Education of the product is to identify ways in which the programme has failed to serve the students. Information from the product evaluation is important for improving the context, input, process and product by every programme. Information from the product evaluation could also be used to modify or terminate a programme if any shortcoming is identified.

Instruments of Evaluation in Agricultural Education

Agricultural educators according to Osinem, (2008), Egbule, (2002) and Olaitan, (1984) have devised various measures the learnersô ability and educational outcomes could be appraised. These instruments include;

i. Oral tests;

ii. Achievement tests;

iii. Performance tests;

iv. Observational schedule;

v. Interview schedule ;

vi. Questionnaire; and

vii. Socio-metric technique

Oral Tests: An oral test is a type of test that involves communication between the examiner and the testees. The test is usually associated with informal testing situations. Tests according to Oranu and Ogwo (2006) are described as systematic procedure for measuring indirectly, a sample of an individualôs behaviour. The systematic nature of tests implies that its content, procedure of administering and scoring must follow an organized and regular pattern.

Achievement Tests: This is a paper and pencil (written) examination. It measures the amount of knowledge possessed by the students in course content. Agricultural educators according to Osinem (2008) do not have to use paper-and-pencil examination only to measure learnersô abilities and educational outcomes. This is because achievement tests measure only the acquisition of cognitive knowledge neglecting the psychomotor and affective domains. Most achievement tests are teacher made and they consist of essay and multiple test item questions. Achievement test according to Okoro (2002) could also be in the form of standardized test which are not classroom teacher made. They cover a wide content area and best suited for measuring achievement of broad curriculum objectives.

Skills performance tests: Performance tests are the most direct and reliable method of assessing the level of skill possessed by students. Osinem (2008) and Olaitan (1984) stated that any educational test that does not promote the right altitude (affective domain) and skill acquisition (psychomotor domain) is less useful in Agricultural Education. Performance test explores the potential of affective and psychomotor domains of objective. These domains are very much emphasized in Vocational Agricultural Education. Performance tests are administered through process assessment and productive assessment. In process assessment the student is observed while performing the task

assigned to him and his level of performance is rated. In this, the occupational teacher has to observe the student perform a giving task from the beginning to the end. Basically two measures could be use in assessing process measure. These are those relating to the quality of work done and the speed of work done. The process examination enables the Agricultural Teacher to evaluate and rate the quality of work.

In product assessment, the occupational teacher focus on the end result of a process and an assessment is made to determine how the product confirms to the expected specifications. The product assessments are not interested in the procedure adopted in task performance but in the product or the object produced.

Observational schedules: Observational schedule according to Okoro (2002) is an instrument in which events that are directly observed as they occur are recorded and the information is analyzed for the purpose of decision making. The teacher observes the student both under formal and informal situations and records the observation using check list and rating scales. Observation techniques eliminates the bias associated with the information which people give about themselves as in the case of using interview and questionnaire.

Check - List: This is a listing of steps in performing an activity in which the observer observes the presence or absence of traits/characteristic. Ogwo and Oranu (2006) explained checklists to involve outlining of skills, traits, activities, steps or topics to be performed or exhibited by the students. They are used to give more objectivity to observation and yield the bases for systematic classification of data. Checklists help to record continually the account of studentsô progress in performance tasks of different projects and enable the immediate record of manifested behaviour. They could be used to measure improvement or otherwise in skills, knowledge, interests and attitudes.

Rating Scale: This is measuring instrument used as observational tools for determining the relative position of an individual on a series of traits or the characteristics of work process or product by

checking the description or number which represents exactly the degree of development observed. They are used in measuring attitudes, appreciations, aspects of social adjustment and skills. Rating scale according to Osinem (2008) and Ogwo and Oranu (2006) are of three types; Graphic rating scale which could be structured in the constant alternative or the changing alternative forms; the descriptive scale describes the degree of the trait in behavioural terms while numerical rating scales employ numbers to quantify the different degrees of each trait or characteristics.

Interview Schedules: An interview is a face-to-face or telephone, videophone discussion, which a person (teacher) holds with a respondent (student) which is often used to verify and complement other information about the respondent. As stated by Osinem (2008), the use of interview schedule to collect evaluation information usually goes beyond a list of simple question which may be answered by mere yes or no.

Ogwo and Oranu (2006) noted that interview schedule could be used to obtain additional information in on cognitive and affective domain activities. For example, they could be used to record studentsô feelings on their extent of adjustment that could have been difficult to observe in the classroom. Objectivity and reliability of the interview schedules are low but could be improved by careful recording of respondentsô exact words. Ogwo and Oranu (2006) suggested that the following should be considered when deciding to conduct an interview:

1. Determining the purpose of the interview from which the relevant questions could be structured out;
2. Establish rapport with respondent in order to create a relaxed atmosphere necessary for free expression;
3. Keep accurate records as much as possible while the interview is going on
4. Interviews should be short and restricted to those students desiring special attention;
5. Commence with general questions and later delve into details; and

6. At the end of interviews, avoid statement indicating finality rather suggests further discussion if the need arises.

Questionnaire

A questionnaire comprises of series of questions designed to obtain information about a given subject. Osinem (2008) explained questionnaire to mean evaluation instrument that is commonly used by individuals to rate the opinion on a specific list of attributes. It could be used by individuals to respond to questions about themselves regarding such matter as their feelings, attributes, interests etc. Osinem (2008) stated that a questionnaire could be open ï ended, that is open response or close ended, that is structured response. In an open ended format, the questionnaire options are not given, instead the respondents are free to provide their responses using any format that suits them. On the other hand, in a close ended or structured response questionnaire, options are provided to the questions or statements (items). In other words, the respondents are restricted.

Socio-Metric Technique: Socio-metric technique according to Osinem (2008) and Ogwo and Oranu (2006) is aimed at evaluating the pattern of social relationship in a group of students and finding out the extent of which a person is accepted by his peers in a given situation. A socio-metric test is used to gather evaluation information on interpersonal relationship among members of the group. Such a test asks members of the group to select and name other persons in terms of a criterion proposed by the examiner. The examiner analyzes the choices by using a socio-gram.

In the context of this study, evaluation in IAKP should be done continually to determine whether the learning experiences and content presented to the learner contributes to the behavioural changes desired in a student utilizing different measurement instruments as discussed above.

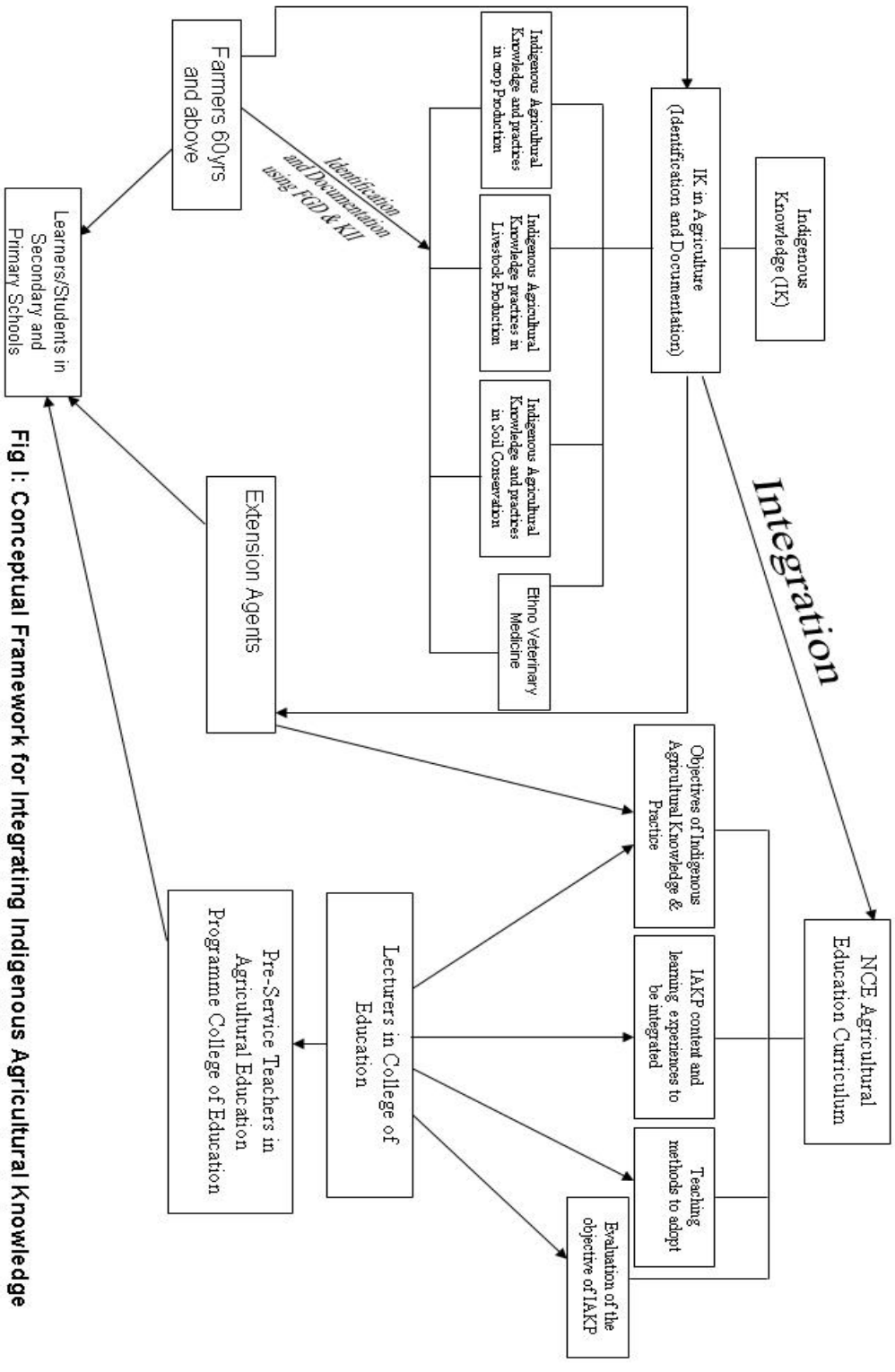

Fig I: Conceptual Framework for Integrating Indigenous Agricultural Knowledge and Practices into NCE Agricultural Education Curriculum

(Developed by the Researcher)

The Conceptual Framework of the study is guided by the Schema in **Figure 1.**

Indigenous knowledge (IK) is knowledge that people in a given community have developed overtime and continues to develop. It covers the whole range of human experience including Indigenous Agriculture Knowledge and Practices (IAKP). Farmers possess indigenous knowledge in crops they produce, livestock they rear and equally possess knowledge of soil conservation and ethno-veterinary medicine. These IAKP was identified and documented by from the aged farmers of 60years and above using key informant interview (KII) and Focus Group Discussion (FGD). Extension Agents who work with farmers in their rural settings could equally identify and document IAKP. They help to disseminate information to the people, assisting them in acquiring needed knowledge, attitude and skills in order to benefit from information available. Extension Agents transmit information through indigenous channels and they would help in locating those local experts who had the most knowledge about IAKP. Extension Agents can also transmit IAKP document to learners in informal setting or in formal setting as a resource person.

Information on IAKP and ethno-veterinary medicine would be collected from aged the farmers above 60years because they had lived long enough to experience IAKP. Learners in informal setting learn from the aged farmers through observation, imitation and modeling. The IAKP identified from farmers would be packaged and integrated into NCE Agricultural Education Curriculum utilizing Tyler, Wheeler and Kerrôs Curriculum Development model to evolve the IAKP objectives, content to be integrated, teaching method to adopt and evaluation procedures for evaluating the IAKP objectives. Lecturers in Colleges of Education and Extension Agents will ascertain the relevance of the objectives, content, learning experiences, teaching methods and evaluation methods to be adopted for integration since they possess enough competence based on the training they received.

The curriculum produced will be integrated into the relevant courses in the curriculum of Agricultural Education for teaching Pre-Service teachers of agriculture in Colleges of Education who would in turn teach pupils/students in Primary and Secondary schools. Therefore, there will be no generational gap in the utilization of IAKP for sustainable agriculture.

Theoretical Framework

Curriculum Development, Design and Models

Curriculum is viewed from different perspectives and has many definitions as individuals perceive it or its implication. The whole education is largely concerned with curriculum, either its development or implementation. In whatever way, curriculum is defined or explained, the experts have agreed that it has three major components or common places; and these are teaching, learning and governance.

According to Ivowi (2009), Curriculum is regarded as the systematic body of materials and organized plan put together to modify the behaviour of a person in his or her environment. The materials would include the objectives and knowledge to be acquired while the plan includes the instructional activities and resources designed to affect the materials.

Gowin (1981) grouped the various definitions of curriculum into three common places of teaching, learning and governance. Curriculum as teaching views the subject taught in school as the focus. In this regard, curriculum is perceived as what the teacher uses in teaching or what he teaches. In other words, the content for stimulating learning in school is called curriculum. The second group of definitions of curriculum is a very popular view and perceive curriculum as all the experiences of the learner under the supervision of the school. There are many variants of this view, some of which are showed by the following: (a) All the experiences a learner undergoes in school; (b) All the things a child is expected to learn at school; and (c) The schools programme for learners.

The third group of definitions views curriculum as all the experiences of children for which the school accepts responsibility. Various claims under this definition include the following: (a) The authority of the school to guide educational experiences of the child; and (b) The right of the school to organize, design, plan and control the sequence of events that would lead to learning outcomes.

It is in the consideration of these claims that all activities authorized by the school for the children but which are not necessarily examined are referred to as extra ï curricular activities. Initially, they were regarded as extra ï curricular because they did not feature on the school time table. However later consideration on their complementary role to school subject(s) on the school time table perceived them as another set of un-examinable subjects or activities that complete the expected experiences of learners in school. Such activities are varied and may include the following : (a) All sports practices and competitions; (b) All literacy and debating competitions;(c) All science and technology quiz, fairs, exhibitions and competitions; (d) All field trips, excursions; and (e) All activities of approved clubs and societies.

Gowin (1981) defined curriculum as a logically connected set of conceptually and pedagogically analyzed knowledge and value claims. In this definition, Gowin claimed a connection between concepts, events and facts as having a shape of V; and when this V is placed on primary sources of knowledge, the product is referred to as conceptually analyze. The analysis explained the structured relations between conceptual domain, methodological and factual domain. The concepts of teaching and learning and curriculum according to Ivowi (2009) are held while trial testing that goes on are referred to as pedagogically analyze. A technique for analyzing materials is concept mapping and it is very useful in structuring curriculum materials and in representing meaningful relationship between concepts in the form of propositions. Hence the structuring of syllabus by use of conceptual approach is natural and logical. Gowin (1981) definition of curriculum rightly looked at curriculum

development as an activity which involves many people working for a long time even outside teaching, learning and school administration.

In Adegoke and Ajeyalemi (1994), an operational definition of curriculum was given as a systematic organization of a set of intentions about learning experiences for certain learners in certain justifiable arrangement of sequence and resources. They listed many implications of the definitions, among which are the following: (a) A curriculum is a set of deliberate intentions or plans; (b)A curriculum is a blue print for activities; and (c) A curriculum involves a highly technical and rational decision making process. Ihebuzor (1993) stated that different practitioners had come up with their own definitions of curriculum such that the field has become a minefield of confusing and conflicting definitions. According to him, while some defined it as a series of structured learning activities designed for a specific group of learning acquiring skills and dispositions within a formal school setting, others define it as all the learning which is planned and guided by the school, whether it is carried on in group or individually, inside or outside the school, yet another group viewed it as much more than just a planned programme of activities. In his view, curriculum is the total learning, planned or unplanned, overt or covert, explicit or implicit, intended or unintended that learners gain from exposure to instruction (Beauchamp, 1981).

Grundy (1987) stated that it is a programme of activities (by teachers and pupils) designed so that pupils would attain so far as possible certain educational and other schooling ends or objectives.

According to Offorma (2005) curriculum is courses offered in educational institutions, which means that curriculum is a race course, which implies that the moment a child starts school; the race begins and stops at the end of the childôs educational career. She went further to state that curriculum is a course of study which students pursue in order to get a degree, a certificate, a diploma or any other forms of academic awards. Curriculum is a structured series of learning experiences intended for the education of the learners. Offorma (2005) noted that curriculum is a programme which

includes programme of activities, programme of studies and program of guidance. Programme of studies is perceived in the form of subjects, contents, subject matters and bodies of knowledge. The programme of activities is made up of all the learning experiences presented to learners. These experiences could be overt or covert; mental or physical. They are also learner oriented and goal oriented. Learners learn through activities and so the programme of activities facilitates the learning of the programme of studies. Programme of guidance is the assistance given to the young and inexperienced members of the society by more experienced persons to help them solve their educational, career or vocational and socio-personal problems. Learners are guided according to their abilities, capabilities, interest, aptitude and socio-economic background.

Curriculum can also be defined as the document, plan or blue print from instructional guide which is used for teaching and learning to bring about positive and desirable learner behaviour change. It can be regarded as the road map for the education of the learners. Curriculum can be taken to mean the instrument by means of which schools seek to translate the hopes of the society in which they function into concrete reality. It is planned and sequenced. It is a vehicle through which education is attained. The essence of education is the ability to transfer the knowledge, facts, skills, values and attitudes learnt from one situation to solve problems in another situation and this is done through curriculum. Since curriculum is a means by which schools seek to translate the hopes of the society into reality, IAKP can also be transferred to learners especially the younger generations.

Curriculum development refers to the production of a structured set of learning experiences; while curriculum development process refers to the stages undergone to produce the experiences. According to Ivowi (2009), the parts or stages of curriculum development process are called elements and the relationship among these elements is referred to as curriculum development models. Curriculum development model is seen as a framework or plan of action for designing the structured set of learning experience. The course of action in curriculum development is usually guided by

theory so that the overall effect of such actions could be predicted, evaluated and improved upon in a systematic manner.

Curriculum Development Models

Various models have been proposed for the planning and developing a curriculum. These models include; Tylerôs model, Wheelers model, Kerrôs model, Tanner and Tanner model and so on.

Tyler's Model of Curriculum Development

Tylerôs model of curriculum development is in linear form. He is of the view that specifying aims and objectives is the beginning of curriculum development while evaluation is the end of the design. Tylerôs model has been described as a linear model as shown below:

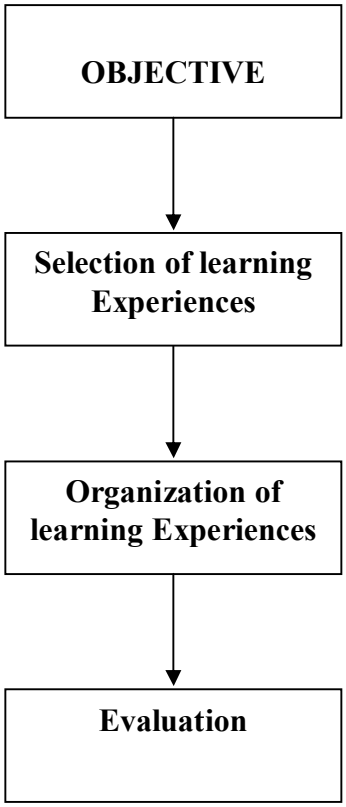

Figure 2: Tyler's Model of Curriculum Development.

The model proposed by Tyler above began with a mandate for seeking answers to four fundamental questions which must be answered in developing any curriculum or plan of instruction. The questions include:

1. What educational purpose should the school seek to attain?;
2. What educational experiences can be provided that are likely to attain these purpose?;
3. How can these educational experiences be effectively organized?; and
4. How can we determine whether these purposes are being attained?

Tylerôs curriculum model is related to the present study in that it set to determine the IAKP objectives to be integrated into NCE Agricultural Education Curriculum and also determine the evaluation procedure for assessing the objectives. These were reflected in the first and the last segment of Tylerôs linear model.

Wheeler's Model

Wheelers model for curriculum development was conceived to take care of the criticism of the Tylerôs model. In this model, Tylerôs model was converted into a cyclic and continuous process as shown below;

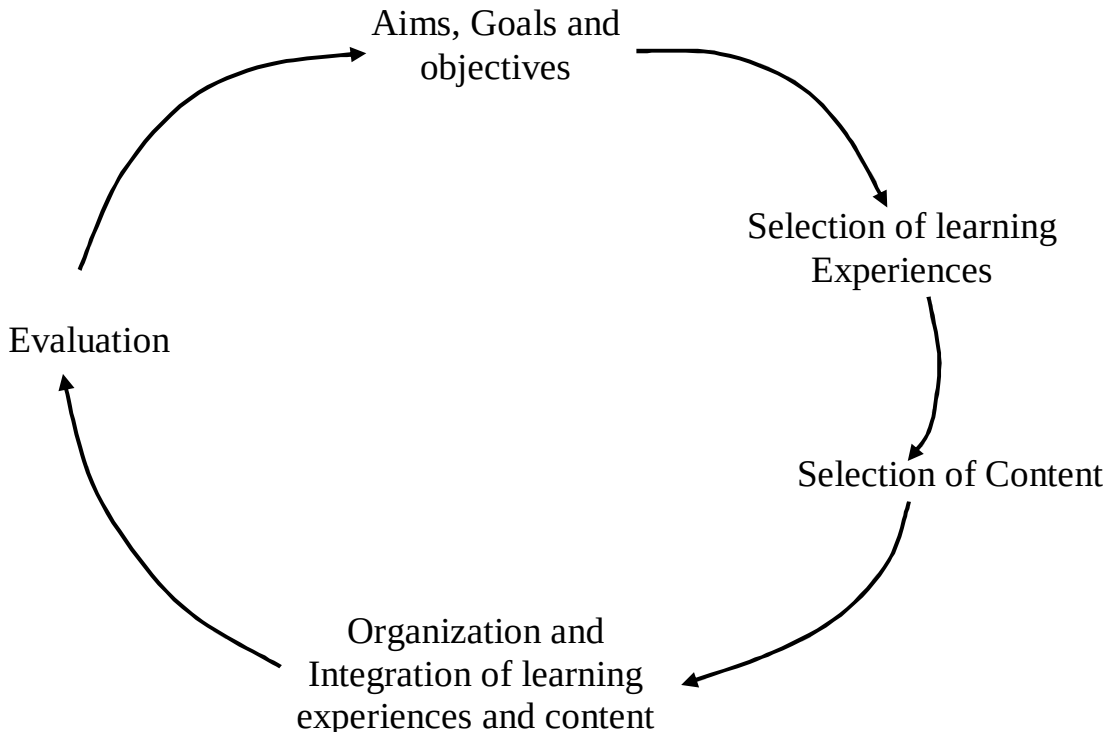

Figure 3. Wheelers Curriculum Model

Wheeler (1978) model consist of five phases. They include:

1. The selection of aims, goals and objectives;
2. The selection of learning experiences to help in attainment of aims, goals and objectives;
3. The selection of content through which certain types of experiences may be offered;
4. The organization and integration of learning experiences and content with respect to the teaching learning process within school and classroom; and
5. Evaluation of the effectiveness of the learning experiences and content for the attainment of the aims and objectives.

The basic assumption on which this model rests is that the end of educations is to change behaviour. In this sense, it is perfectly right to state that the end of education is always and everywhere the same. Wheelerôs curriculum model is related to the present study in that the study is set to determine the IAKP objectives to be integrated into NCE Agricultural Education curriculum, content and evaluation procedure for assessing the objectives. These segments were captured in Wheelers cyclic model.

Kerr's Model of Curriculum Process

The model proposed by Kerr began with a formulation of objectives which were interrelated to the content, learning experiences and evaluation as presented below:

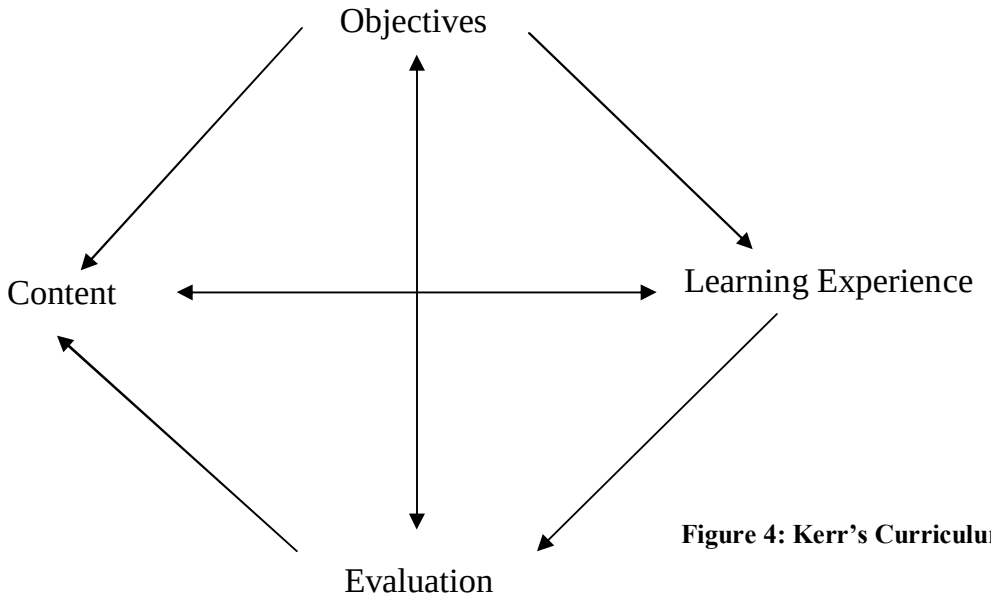

Figure 4: Kerr's Curriculum Model.

Kerrôs curriculum model is more comprehensive than Tylerôs and wheelerôs models. The curriculum component in Kerrôs model are interrelated and developed on each other. There is high level of dependence among all aspects of Kerrôs framework. This is shown in the double-headed arrow linking each stage with the others. Kerrôs frame work is related to the present study in that the study is to determine the IAKP objectives, content and evaluation procedure for assessing the objectives which Keer captured in his curriculum model.

With curriculum models explained, it is necessary to point out that no single theory of curriculum will solve all curriculum problems. This is because of the complex and problematic nature of curriculum itself. (Olaitan and Ali, 1997). The present study will adopt Wheelerôs, Tylerôs and Kerrôs curriculum models. This is because they form a theoretical framework for other theorists in developing curriculum. Tylerôs, Wheelerôs and Kerrôs philosophies are very similar to contemporary views in many ways. .They described education as an active process which involves the active effort of the learner himself. Linking up Tylerôs, Wheelerôs and Kerrôs models with the NCE Agricultural Education Programme/Curriculum, relevant objectives, content, and evaluation activities on Indigenous Agricultural knowledge and practices could be selected and integrated into the curriculum. Therefore, in line with this study, the researcher is determined to identify IAKP in the study area and determine the objectives, content and evaluation procedures for integration into NCE Agricultural Education Curriculum.

Review of Related Empirical Studies

Many researches had been conducted in curriculum integration and indigenous Agricultural knowledge and practices.

Lemchi (2005) carried out a study on integrating entrepreneurship education into the NCE Home Economies programme. The design of the study was a survey. The population comprised of all

Home Economics students and lecturers in Colleges of Education in south-eastern geo-political zone of Nigeria and entrepreneurs in Home Economics related businesses. She made use of questionnaire and interview schedule for data collection. Data collected were analyzed using mean and t-test. She found out that there was need to review the Home Economics curriculum at the NCE level to make it more effective for preparing students for self employment. She recommended that curriculum planners should utilize the objectives, learning experiences, instructional methods, evaluation techniques and guideline for integrating learning experiences which were identified in the study for reviewing and re-planning the entrepreneurship education for Home Economics Education.

Lemchiôs study is related to the present study in that both are concerned with integration into the curriculum of NCE utilizing objectives, content, learning experiences and evaluation that were identified. The area of the study, data collection and analysis procedure are related. However Lemchiôs study was on integrating entrepreneurship Education in NCE Home Economics curriculum while the present study is on integrating IAKP into Agricultural Education Curriculum.

Sundaramari and Ranganathan (2003) conducted a study in Talmil Nadu district in India which aimed at documenting and analyzing IAKP in all the four cropping systems in the area. The study adopted survey design. The population for the study was 120 aged and experienced farmers selected from the villages. Informal interview method and questionnaire were used for collecting data on IAKP in different agricultural crops cultivated. Mean, percentages, regression analysis and factor analysis were used to analyze the data collected. The findings showed that farmers utilized IAK in most crops they produce and these IAKP are passed from generation to generation.

The study above is related to the present one in that it aimed at documenting IAKP. The selection of the members of the population was the same and instrument for data collection are also the same. However, the present study differed majorly because it geared to document IAKP in animal production, soil conservation and ethno-veterinary medicine and integrate it into the NCE

curriculum which the above study were not concerned with. Also, the study analyzed some aspect of the work qualitatively while mean and t-test statistic were used to analyze other aspects of the work.

Eni (2005) investigated the indigenous and modern technologies used by farmers in livestock management in Cross River State of Nigeria. He formulated six research questions that guided the study and tested six hypotheses. The population comprised all the traditional farmers who used indigenous knowledge and modern farmers who used western technologies in the management of their livestock. A sample of 362 farmers comprising 270 indigenous farmers and 92 modern farmers were used. Questionnaire and interview schedule were used to collect data from the respondents. The data collected were analyzed using percentages and mean while t-test statistic and ANOVA were used to test the hypotheses. The study found out that the indigenous farmers depended solely on their indigenous knowledge in the preparation and application of curative remedies to heal or treat many animal diseases. They performed several practices such as drenching, deworming and bone setting of animals. They also identified trees, shrubs and herbs of medicinal and curative importance and were able to exploit their therapeutic significance and this made them to live in close relationship with their environment.

The study above is related to the present one in that both deal with Indigenous Knowledge of Farmers in Agriculture. The same methodology was adopted. However, the present study covered both livestock and crop production and also aims at integrating the identified IAKP into the school curriculum.

Gadzirayi, Mutandwa, Chinya and Chikasha (2006) carried out a study on indigenous knowledge system in sustainable utilization of wetlands in communal areas of Zimbabwe. A descriptive survey design was used to collect information from 280 farmers in seven villages using structured questionnaire. Mean statistic was used to analyze the data collected. The findings showed that most farmers used a wide range of indigenous knowledge techniques which include the use of

organic manure, mixed cropping etc. for sustainable management of wetlands. The study recommended that indigenous knowledge system development action should be based on multi-sectoral approach involving all institutions of the society. The study relate to the present one in that both deal with indigenous knowledge for sustainable agriculture and the methodology are alike. However, while the study above recommended for involving institutions in indigenous system development action, the present study is integrating indigenous knowledge into the school curriculum for sustainability.

Again, Akullo and Kanzikwera (2007) conducted a study on Indigenous Knowledge in Agriculture: a case study of the challenges in sharing knowledge of past generations in a globalized context in Uganda. The study utilized cross-sectional survey design. Individual interviews were conducted with 240 farmers from a randomly selected sample from the parishes where Focus Group Discussion (FGD) were conducted. Mean was used to analyze the data collected. The findings revealed that indigenous knowledge were used by all farmer categories, that IK was dominant, easily accessible, safe to man, animals and promotes social cohesion due to the mechanism of dissemination. The study recommended that IAKP was useful and must be integrated with contemporary research agenda to enable farmers compete and respond to global opportunities and challenges respectively. The study conducted by Akullo and Kanzikwera had many things in common with this study especially on the subject matter of IAKP and the use of interview schedule and FGD. However while the study above recommended for integration into contemporary research, the present study aims at integrating into the regular school curriculum for transfer to upcoming generations.

Dialla (1994) conducted a research on the adoption of soil conservation practice in Bukina Faso. A survey research design was adopted. A total of 120 male heads of households were selected and interviewed. The study found out that building soil conservation techniques on a base of local

knowledge can improve the rate at which they are adopted; the knowledge reflected in indigenous conservation practices was the product of life long experience in managing natural resources and that indigenous soil conservation practices were ecologically sound and should be supplemented and improved upon rather than replacing by modern technologies. The study recommended that indigenous soil conservation system should be improved and not carelessly supplanted by international scientific knowledge systems which were not environmental friendly.

The work of Dialla is related to the present one in that it focused on indigenous conservation practice which was an aspect the present study investigated as well as integrating the knowledge to the school curriculum to avoid extinction.

African Technology Policy Studies Network (ATPS) (2002) conducted a study on documenting IK in Swaziland focusing on its application in agricultural practices, natural resources management and livelihood systems. The study made use of survey design. Men and women who were using IK in their farming activities were selected for the study. An interview schedule was used to gather information from the key informants. Participatory Rural Appraisal (PRA) methods were used to gather information in domestic foods, wild fruits/foods, and natural resources, use of trees for dyeing, treatment of livestock and human ailments and other indigenous practices. The finding revealed that many indigenous trees/plants were identified as useful for livestock. They were used for treatment of ailments, breeding purposes and fattening cattle. The present study has many things in common with the study of ATPS especially in methodology of the research. However, the study was to identify and document IK on agricultural practices, natural resources management and livelihood systems while the present study goes beyond documentation of IK but integrating into NCE Agricultural Education curriculum..

Finally, Aluu (2010) conducted a study on Determination of Environmental Education Elements for integration into the Nigeria Certificate in Education (NCE) Agricultural Education

Curriculum. The study adopted a survey research method and the study area was South-East and South-South geo-political zones of Nigeria. The population comprised 176 respondents made up of Agricultural Education lecturers, curriculum specialists and environmental education experts. Questionnaire was used to collect data from the respondents while the data collected was analyzed using mean, percentages and ANOVA. The study identified the specific objectives and learning experience of Environmental Education to be integrated into NCE Agricultural Education curriculum. Again the instructional method, instructional materials and evaluation techniques for teaching Environmental Education in NCE Agricultural Education programme were determined. There is a relationship between Aluuôs study and the present study. Both focused on integration into NCE Agricultural Education curriculum. The same methodology was adopted and part of the population (Agricultural Education Lecturers) was also used. However, Aluuôs study focused on integration of Environmental Education while the present study focused on integration IAKP into the NCE Agricultural Education curriculum.

Summary of the Literature

IK is the knowledge used by local people to make a living in a particular environment. It evolves *in situ* and is dynamic and creative, constantly growing and adapting to meet new conditions. IK is considered to be cultural knowledge in its broadest sense. It is embedded in a dynamic system in which spirituality, kinship, local politics and other factors are tied together and influence one another. IK has many positive aspects and integrating it into the school curriculum could contribute to local empowerment and continuity and could provide valuable input for alternative natural resources management strategies.

Literature has been reviewed on the various sections that relates to IAKP and its integration into NCE Agricultural Education curriculum. The literature confirmed that IAKP are cost effective, time tested, eco-friendly and could serve to sustain the agricultural development. The literature also

revealed that indigenous farmers possess the indigenous knowledge which cut across the crops they cultivate, animals they rear and conservation of the environment where they live. Again the literature showed that IAK are held in peopleôs brain and mind, it has not be documented and most of these aged are dying with the wealth of IAKP they possess. It is then suggested that IAKP could be documented using village level workshops, group discussions with farmers, artisans, publication of newsletters in local language, participant observation etc.

Furthermore, literature was reviewed on curriculum theory, design and development and finally Agricultural Education and curriculum development in Agricultural Education emphasizing on formulating specific objectives, content, teaching methods and evaluation techniques. Therefore the present study tends to fill the gap in literature by documenting the IAKP in crop and animal production, soil conservation and ethno- veterinary medicine and integrating them into the school curriculum to fill the generational gap in Agricultural knowledge transfer.

CHAPTER THREE
RESEARCH METHODOLOGY

This chapter described the procedure which the researcher adopted in carrying out the study. The procedure was discussed under the following headings: design of the study, area of the study, population for the study, sample and sampling techniques, instrument for data collection, validation of the instrument, method of data collection and method of data analysis.

Design of the Study

The study adopted descriptive survey design and Rapid Rural Appraisal (RRA). Survey design focuses on people, the vital facts of people and their opinions, attitudes, motivations and behaviour. It involves asking questions to a group of individuals called respondents (Eboh 2009, Ali 2006, and Ary and Asghar, 2002). This study involved selecting and studying samples of the population in order to make value judgment about the respondents from a cross section of lecturers, extension agents and farmers who are associated with the phenomenon under investigation.

Again, RRA was utilized in the study. According to Eboh (2009), RRA involves family of methodologies designed to get practical information on development issues in local communities quickly. The methods were designed to encourage the participation of local communities in the collection and use of information to improve their livelihood. Hence, the study involved aged farmers who gave information on IAKP as well as ethno-veterinary medicine. These methods were suitable because they involve eliciting information from group of individuals that participated in the providing information relating to the study.

Area of the Study

The study was conducted in South Eastern Nigeria which comprised five states namely: Abia, Anambra, Ebonyi, Enugu and Imo States. The five States had many things in common like the same climate, practise the same system of agriculture and the farmers mainly produced crops like yam, cassava, maize etc and reared animals like goat, fowls and sheep on subsistence level in rural areas.

The farmers were versed in ethno-d veterinary medicine which they utilize in treating animal diseases.

Population for the Study

The population for the study was 566 made up of 120 aged farmers who were above 60 years of age versed in indigenous knowledge and practices, 316 Extension Agents, and 85 Agricultural Education lecturers in Colleges of Education in the study area (States Agricultural Development Project (ADP)/ Ministry of Agriculture (2011) and Personnel Department in Colleges of Education in the study area (2011). Aged farmers were chosen because they had lived long, witnessing the changes in agricultural development and have IAKP information recorded in their memories. Extension Agents work with farmers in their rural setting and one of the objectives of extension programme is to improve the outlook of the farmers, whereas Agricultural Education lecturers in Colleges of Education equip the student-teachers with appropriate communication skills for effective transmission of agricultural information in the context of their environment.

Sample and Sampling Technique

Multi-stage sampling technique was used to select respondents for the study. This technique according to Eboh (2009) involves a procedure whereby the selection of units into the sample is organized in stages. Hence, purposive sampling technique was used to select one town each from the States (see Appendix 7), then from the towns selected, proportionate sampling technique was employed to select 50% of the aged farmers which included men and women who were considered well versed in IAKP and ethno-veterinary medicine(see Appendix 7) which yielded 60 respondents. These farmers were identified through the assistance of Extension Agents and research assistants from the various communities selected.

For extension agents, proportionate sampling technique was employed in selecting 50% of the population in each State, hence the sample was 182 (see Appendix 7). All the 85 lecturers in

Agricultural Education Programme in the seven Colleges of Education in the study area were used for the study. The total sample was 327.

Instrument for Data Collection

The study made use of interview schedule and questionnaire to collect information from the respondents. The interview schedule comprised five sections as shown below:

Section A ï Personal Data

Section B ï Identification of IAKP in crop production

Section C ï Identification of IAKP in livestock production

Section D ï Identification of IAKP in soil conservation

Section E ï Identification of farmersô knowledge in ethno-veterinary medicine.

The interview schedule was designed following literature search. It was used to collect information from key informants (Aged farmers) and equally served as a guide for conducting Focus Group Discussion (FGD) among the aged farmers. Questionnaire was used to collect information from lecturers and extension agents. This comprised 163 items arranged as follows:

Part I ï Personal Data; and

Part II ï Questionnaire items.

Section A ï IAKP objectives to be integrated into NCE Agricultural Education Curriculum;

Section B - Content of IAKP to be integrated into NCE Agricultural Education Curriculum;

Section C ï Teaching methods that could be adopted in teaching IAKP in NCE Agricultural Education Curriculum;

Section D ï Evaluation methods to be adopted in assessing IAKP objectives in NCE Agricultural Education Curriculum; and

Section E ï Existing courses in which IAKP could be integrated in NCE Agricultural Education Curriculum.

The items of the questionnaire were structured on a four-point scale with the following response mode: highly relevant (HR), moderately relevant (MR), slightly relevant (SR) and Not relevant (NR) for sections B, C, D, and E while section F was on four-point scale of strongly Agree (SA) Agree (A), Disagree D and Strongly disagree (SD).

Validation of the Instrument

The instruments were subjected to face validation by seven experts from the University of Nigeria, Nsukka; two from Agricultural Extension Department, three from Vocational Teacher Education and two from Curriculum and Instruction Unit of Arts Education. Each of the experts was given a copy of the draft questionnaire and interview schedule. The experts were asked to identify items that were not required for the study, add relevant ones that had been omitted correct any ambiguous statement and make suggestions for improvement on the instruments. Based on their criticisms and suggestions, amendments were made on the instruments to produce the final copy used for the study.

Reliability of the Instrument

The internal consistency of the questionnaire was determined using Cronbach Alpha. The questionnaire was administered to 20 Agricultural Education and Agricultural Extension lecturers of the University of Nigeria, Nsukka .The data collected was used to compute the reliability coefficient which yielded 0.91,0.84,0.87,0.81 and 0.90 for sections A,B,C,D and E respectively. The overall reliability coefficient was 0.90 (see Appendix 6).

Method of Data Collection

The researcher with the help of five research assistants from the various communities selected for the study administered the instruments to the respondents by face to face. Due to the nature of the study which required preliminary information from aged farmers, Key Informant Interview (KII) was conducted in each community selected and was authenticated by conducting Focus Group Discussion

(FGD) with the farmers. The interview was conducted in the local language of the farmers for easy understanding. The result of the KII and FGD yielded data for specific purpose number 1 on identifying and documenting IAKP utilized by farmers in crop production, livestock production, soil conservation and ethno-veterinary medicine. Two hundred and sixty seven copies of the questionnaire were administered to lecturers of Agricultural Education and Extension Agents in the study area which were collected by the researcher and the assistants giving 100% return rate.

Method of Data Analysis

The data collected for research question one was analyzed qualitatively. The information obtained with the questionnaire on research question 2-7 was analyzed using mean statistic. Nominal value was assigned to each scaling item of the questionnaire thus:

Highly Relevant (HR) ï 4 points	Strongly Agree (SA) ï 4 point
Moderately Relevant (MR) ï 3 points	Agree (A) ï 3 points
Slightly Relevant (SR) ï 2 points	Disagree (D) ï 2 points
Not Relevant (NR) ï 1 point	Strongly Disagree (SD) - 1 point

Real limit of numbers were applied in decision making thus:

Nominal value	Range of mean	Decision
4	3.50 ï 4.00	Highly Relevant/Strongly Agree
3	2.50 ï 3.49	Moderately Relevant/Agree
2	1.50 ï 2.49	Slightly Relevant/Disagree
1	0.50 ï 1.49	Not Relevant/Strongly Disagree

From the table above, any item with a mean of 3.50 and above was interpreted as Highly Relevant/Strongly Agree, 2.50 ï 3.49 - Moderately Relevant/Agree, 1.50 ï 2.49 ï Slightly Relevant /Disagree and 0.50 ï 1.49 ï Not Relevant/Strongly Disagree..

The stated hypotheses were analyzed using t-test statistic at .05 level of probability. Any item with calculated t-value of less than 1.96 at 0.05 level of significance was accepted, otherwise rejected.

CHAPTER FOUR
PRESENTATION AND ANALYSIS OF DATA

This chapter deal with the presentation and analysis of data collected for the study. The presentation and analysis were made according to the research questions and hypotheses.

Research Question 1

What are the IAKP utilized by farmers in Agricultural Production?

The data for answering research question 1 were presented in Table 1a

Table 1a: Qualitative analysis of the responses of farmers on the IAKP utilized in agricultural productions.

Key Informant Interview (KII) and Focus Group Discussion (FGD) reports on Indigenous Agricultural Knowledge and Practices (IAKP) utilized by Farmers in Crop Production

S/N		YAM	CASSAVA	MAIZE
1.	SITE SELECTION	Farmers select sites for yam based on - Land that is fallowed for at least two years - Land that is free from shade. - Land that has adequate sunlight. - Soil that is gummy and dark in colour - Land that is free from flood - Soil where earthworm is found	Farmers select sites for cassava based on - Fallowed land - Well drained soil - Land that is free from shade - Land that has adequate Sunlight	Farmers select sites for maize based on - Well drained soil - dark soil is preferable - land that is free from shade.
2.	CLEARING	- Slashing with cutlass/hoes - Burning in heaps to produce ash.	-Slashing with cutlass/ hoes - burning in heaps to produce ash	- Slashing with cutlass/hoes - burning in heaps to produce ash
3.	CULTIVATION	- Pits are made, kitchen refused/ other vegetative materials are dumped into the pit which will later covered to make mounds - ridges	- mounds - ridges.	- Mounds - Ridges - Non-tilth/zero tillage.
4.	SELECTION OF PLANTING MATERIALS FOR CULTIVATION	Farmers select planting materials based on - those that sprout before planting - those that are free from pests and diseases - those that are free from bruises - they use the head pieces of yam for planting - plant small whole yam - practice yam minisette technique	- use stem cutting for propagation - use of healthy stems - use of stems with enough nodes	- selection of big sized grains for cultivation - selection of grains that are free from weevil/pests - pre-soaking of the grains in water and those that floats are removed.
5.	WEEDING	- Hand pulling of weeds and hoeing - suppressing weeds using mulch material - practicing, shifting cultivation and fallowing - practicing inter-cropping	- Hand pulling of weeds and hoeing - slashing weeds with cutlass - uprooting and burning parasitic weeds like striga	- Hand pulling of weeds and hoeing
6.	MANURE APPLICATION	- use of compost/decay organic matter. - use of kitchen refuse	- use of compost and farmyard manure	- use of compost farmyard manure.
7.	DISEASES & PESTS CONTROL	- Spreading/dusting planting materials with ash to control pests - Soaking planting materials in mashed solution of *occimum africana* (Nchuanwu) to reduce pests attack - Practising farm sanitation , shifting cultivation fallowing and mixed cropping - Use of local cultivar that is resistant to pests and diseases - Hand picking of pests of beetle -Use of bird scare against bush fowl (okwa) - Early planting	- early planting - use of animal urine and excretes to ward off pests - dusting the planting materials with ash - handpicking of caterpillars and the likes - Sanitation of the farm - Mixed cropping - Shifting cultivation/ fallowing - Use of resistant local cultivar - Selection of clean planting material	- Selection of clean planting materials - Use of resistant local cultivar - Use of ash to control weevils/ other insects. - Uprooting/removal of infected plants - early planting
8.	HARVESTING	- harvest when yam vine wither and die - practice first and second harvest for ware yams - harvest by hand to avoid inflicting bruises on the tuber	- harvest when matured depending on variety - harvest with hoe or cutlass.	- Use of cutlass/sickle
9.	PROCESSING	- Cutting of attached roots with knife - Sorting of bruised ones from the heap	- Processed into garri - Processed and dried for flour - Soak in water and allow to rett to prepare foo foo (akpu)	- removal of husks by hand - sun drying of cobs - smoking over the fire place - ground and processed into flour
10.	STORAGE	- Store in barns under shade - store under well ventilated thatched house on a platform	- foo-foo (akpu) can be stored in a basin with salt and lime sprayed on top of it - can store underground in the field - garri and flour can be stored in bags	- hanging over the fire place - hanging in a well ventilated thatched house - store in bags fumigated with pepper.

Table 1b: Indigenous Agricultural Knowledge And Practices (IAKP) Utilized by Farmers in Livestock Production

S/N		GOAT	CHICKEN
1.	SELECTION OF BREEDS	Selection is based on those that have - big body size - Large litter size - broad tails - fine wool	Selection is based on - plumage colour of the birds - weight of the chicken (heavy breeds) - naked-neck breeds are selected - frizzled feather chickens are selected by healers
2.	HOUSING	- kept under thatched house - kept in goat shed - allowed to roam about inside the compound	- kept in a basket - sleep on the fence after roaming about - kept in a corner of a kitchen.
3.	FEEDING	- feed on residue from processed grains - feed with kitchen wastes - feed on browse plants and other fodder - feed on harvest and house Waste	- feed on residues from processed grains - feed on kitchen wastes - pecking on vegetable/leaves
4.	ROUTINE MANAGEMENT PRACTICES	- Castrating with sharp razor blade by cutting the vein that leads to testicles. Bitter leaf, siam weed and palm oil are used for medication and stoppage or bleeding. - identification of animal by ear notching, tattooing, giving of marks and use of tags.	- identified by the use of rings/ribbons or piece of Clothes which is tied to the wings. - detoeing.
5.	PEST AND DISEASE CONTROL	See ethno veterinary medicine utilized by farmers.	See ethno veterinary medicine utilized by farmers.

Table 1c: Indigenous Agricultural Knowledge Utilized by Farmers in Soil Conservation

SOIL WATER	-mulching with dry grasses, palm fronds and leaves
CONSERVATION	-spreading of compost manure and animal dung
	-practising of nursery under shade
	-multiple cropping
	-planting of cover crops.
SOIL FERTILITY	-applying compost manure
CONSEVATION	-use of animal dung
	-practicing crop rotation
	-shifting cultivation
	-cover cropping and planting of legumes.
	-multiple cropping
	Inter cropping
SOIL EROSION	-practicing non tilth/zero tillage
CONTROL	- construction of bunds to wage run off
	-making big mounds to reduce run off and flooding
	-planting of trees like bamboo in erosion prone areas
	-planting of perennial vegetation on field bunds
	-covering erosion sites with sand and stone

Table 1d : Ethno-Veterinary Medicine utilized by Farmers

S/N	DISEASES/PESTS	ETHNOVETERINARY MEDICINE
1.	Scabies in livestock (goat/sheep)	- Use of palm kernel oil - Mix kerosene with ash and rob on the animal
2.	Mites attack coccidiosis in poultry	- palm oil - use of ground alligator pepper (*Afromonam melegueta*) mixed with feed - mixture of ash and ground pepper
3.	Cold and cough in livestock	- use of bitter kola crushed with citrus lemon grass (*cymbogon citrates*) in drinking water.
4.	Diarrhea	- use of: garlic (*Allium satvium*) mixed with the feed. - potato leaves
5.	Internal worms in goat/poultry	- use of: thyme (*Thymus valgaris*) - hot leaves (*occimum africana*) - potato leaves - paw-paw seeds
6.	Stoppage of bleeding in livestock	- use of: siam weed (*chromolaena odoratum*) - bitter leaf (*vernonia amygdalina*) - pulp of (*Eleasis guinensis*) - pulp of coconut (*Cocus nucifera*)
7.	Poison	-use of red palm oil
8.	Disengagement of placenta and other reproductive problems	- use of: cowpea leaves and salt - potato leaves - (*Spondias mombin*)(ijikere) - (*Newbouldia laevis*)(ogirishi).
9.	Ecto-parasites like tick etc	- use of palm oil - Hand picking - pricking with sharp object.

Table 1a, 1b, 1c and 1d showed that farmers utilize various IAKP in crop production, livestock production, soil conservation and ethno ï veterinary medicine. IAKP are applied in various stages of crop production which include site selection, clearing, cultivation, selection of planting materials for cultivation, weeding, manure application, diseases and pest control, harvesting, processing and storage.

In livestock production, IAKP are applied in selection of breeds, housing, feeding management practices, and pest and diseases control. Different IAKP are applied in soil conservation particularly on soil water conservation, soil fertility conservation and soil erosion control. In the application of ethno- veterinary medicine, various diseases and pests were

identified by farmers and different curative materials and concoctions were utilized in the treatment and control of diseases and pests.

Research Questions 2

What are the specific objectives of IAKP for integration into NCE Agricultural Education Curriculum?

The data for answering research question 2 was presented in Table 2 below.

Table 2: Mean ratings of the responses of Lecturers and Extension Agents on the specific objectives of IAKP for integration into NCE Agricultural Education curriculum.

S/N	Objectives of IAKP	$\bar{\times}$	SD	Remarks
1	Define the concept of indigenous knowledge (IK) and indigenous Agricultural knowledge and practices (IAKP)	3.77	0.50	Highly relevant
2	Discuss the characteristics of IAKP	3.67	0.61	ñ
3	Appreciate the values of IAKP for sustainable Agricultural productions	3.63	0.56	ñ
4	Outline and discuss the constraints to the utilization of IAKP by farmers	3.56	0.56	ñ
5	Outline ways of documenting IAKP for preservation	3.52	0.60	ñ
6	Describe and utilize IAKP in crop production	3.65	0.61	ñ
7	Describe and utilize IAKP in livestock production	3.71	0.57	ñ
8	Describe and utilize IAKP in soil conservation	3.80	0.47	ñ
9	Describe and utilize ethno ï veterinary medicine in livestock health management	3.58	0.74	ñ
Cluster Mean		3.65	0.58	HR

Table 2 had nine items with their means ranging from 3.52 to 3.80. The mean of each item fell within the response category of highly relevant indicating that all the items were the relevant specific objectives of IAKP for integration into NCE Agricultural Education Curriculum. Again, the cluster mean was 3.65 which fell within the response category of highly relevant. This showed that the respondents considered concepts of IK and IAKP, characteristics of IAKP, values of IAKP, and constraints to the utilization of IAKP as relevant IAKP objectives that are to be integrated into NCE Agricultural Education curriculum .Others include: outline

ways of documenting IAKP, describe and utilize IAKP in crop production, livestock production, soil conservation and ethno-veterinary medicine.

The standard Deviation (SD) of the items ranged from 0.47 to 0.74, indicating that the respondents were not very far from the mean of one another in their responses. This helped to add value to the mean.

Hypothesis 1

There is no significant difference in the mean responses of Lecturers and Extension Agents on the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

Data showing the result of test of the hypothesis are contained in Table 3.

Table 3: t-test analysis of the mean response of Lecturers and Extension Agents on the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

		Lecturers = 85		Extension agents =182				
S/N	**Objectives of IAKP**	$\bar{\times}_1$	**SD_1**	$\bar{\times}_2$	**SD_2**	**t-cal**	**t-tab**	**Decision**
1	Define the concept of indigenous knowledge (IK) and indigenous Agricultural knowledge and practices (IAKP)	3.80	0.43	3.76	0.53	0.63	1.96	NS
2	Discuss the characteristics of IAKP	3.73	0.47	3.64	0.66	1.08	1.96	NS
3	Appreciate the values of IAKP for sustainable Agricultural productions	3.58	0.58	3.65	0.55	0.97	1.96	NS
4	Outline and discuss the constraints to the utilization of IAKP by farmers	3.55	0.64	3.57	0.51	0.17	1.96	NS
5	Outline ways of documenting IAKP for preservation	3.51	0.64	3.52	0.58	0.20	1.96	NS
6	Describe and utilize IAKP in crop production	3.55	0.60	3.69	0.60	1.74	1.96	NS
7	Describe and utilize IAKP in livestock production	3.58	0.58	3.77	0.55	2.67	1.96	S
8	Describe and utilize IAKP in soil conservation	3.64	0.53	3.88	0.41	4.07	1.96	S
9	Describe and utilize ethno ï veterinary medicine in livestock health management	3.48	0.71	3.63	0.74	1.48	1.96	NS

Note: $\bar{\times}_1$ = Mean I, $\bar{\times}_2$ =, SD_1 = Standard Deviation I, SD_2 = Standard Deviation 2, Degree of Freedom =265, NS = Not significant, S = Significant.

The result showed that all the items had their calculated t-values ranging from 0.17 to 1.76 which are less than 1.96 at .05 level of significance and 265 degree of freedom except items 7 and 8 which had their calculated t-value of 2.67 and 4.07 respectively .The t-calculated were greater than the t- table of 1.96. Therefore the null hypothesis of no significant difference was upheld for the entire items except item 7 and 8.This showed that the respondentôs mean responses did not differ significantly on the specific objectives of IAKP for integration into NCE Agricultural Education curriculum for all the items except items 7 and 8.

Table: 4 Cluster analyses of t-test on the mean responses of Lecturers and Extension Agents on IAKP objectives to be integrated into NCE Agricultural Education curriculum.

$\overline{\times}_1$	**SD_1**	$\overline{\times}_2$	**SD_2**	t-cal	t-tab	df	Remarks
3.39	0.30	3.46	0.32	0.27	1.96	265	Not Significant

Note: $\overline{\times}_1$ = Mean I, $\overline{\times}_2$ =. SD_1 = Standard Deviation I, SD_2 = Standard Deviation 2, df =Degree of freedom, t-cal = t-calculated, t-tab = t-table

From Table 4 above, the t ï test cluster of the items showed that the t ï calculated was 0.27 which is less than the t-table value of 1.96 at .05 levels of significance and 265 degree of freedom. This showed that there was no significant difference on the mean responses of Lecturers and Extension Agents on the specific IAKP objectives for integration into NCE Agricultural Education curriculum. Therefore, the null hypothesis was upheld for hypothesis 1.

Research Question 3

What are the IAKP content that should be utilized to achieve the objectives to be integrated into NCE Agricultural Education Curriculum?

The data for answering research question 3 are presented in Table 5.

Table 5: Mean ratings of the responses of Lecturers and Extension Agents on the content for achieving the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

S/N	Questionnaire items	$\bar{X}$	SD	Remarks
	General concepts of IAKP			
1	Concept of IK and IAKP	3.82	0.50	Highly relevant
2	Characteristics of IAKP	3.56	0.59	Highly relevant
3	Importance of IAKP for sustainable Agricultural production	3.66	0.50	Highly relevant
4	Constraints to the utilization of IAKP by farmers	3.63	0.53	Highly relevant
5	Documentation of IAKP for preservation	3.51	0.64	Highly relevant
	Crop production: Yam			
6	Site selection	3.27	0.71	Moderately relevant
7	Clearing	3.14	0.70	Moderately relevant
8	Cultivation	3.25	0.62	Moderately relevant
9	Selection of planting materials	3.22	0.79	Moderately relevant
10	Weeding	3.21	0.68	Moderately relevant
11	Manure application	3.57	0.59	Highly relevant
12	Diseases and pest control	3.50	0.83	Highly relevant
13	Harvesting	3.21	0.75	Moderately relevant
14	Processing	3.31	0.89	Moderately relevant
15	Storage	3.57	0.69	Highly relevant
	Maize production			
16	Site selection	3.39	0.71	Moderately relevant
17	Clearing	3.40	0.61	Moderately relevant
18	Cultivation	3.36	0.63	Moderately relevant
19	Selecting of planning materials	3.21	0.78	Moderately relevant
20	Weeding	3.08	0.85	Moderately relevant
21	Manure application	3.49	0.58	Moderately relevant
22	Disease and pest control	3.52	0.68	Highly relevant
23	Harvesting	3.24	0.79	Moderately relevant
24	Processing	3.46	0.65	Moderately relevant
25	Storage	3.50	0.64	Highly relevant
	Cassava production			
26	Site selection	3.40	0.71	Moderately relevant
27	Clearing	3.28	0.59	Moderately relevant
28	Cultivation	3.35	0.58	Moderately relevant
29	Selection of planting materials	3.36	0.65	Moderately relevant
30	Weeding	3.18	0.67	Moderately relevant
31	Manure application	3.36	0.64	Moderately relevant
32	Diseases and pest control	3.25	0.89	Moderately relevant
33	Harvesting	3.60	0.63	Highly relevant
34	Processing	3.53	0.86	Highly relevant
35	Storage	3.57	0.79	Highly relevant
	Livestock production: goat			
36	Selection of breeds	3.47	0.68	Moderately relevant
37	Housing	3.48	0.72	Moderately relevant
38	Feeding	3.49	0.66	Moderately relevant
39	Routine management practices	3.45	0.67	Moderately relevant
40	Pest and disease control	3.46	0.69	Moderately relevant
	Poultry production			
41	Selecting of breeds	3.36	0.83	Moderately relevant
42	Housing	3.47	0.68	Moderately relevant
43	Feeding	3.50	0.71	Highly relevant
44	Routine management practices	3.39	0.75	Moderately relevant
45	Pest and disease control	3.31	0.86	Moderately relevant
	Soil conservation			
46	Utilize specific plant species for soil water conservation	3.45	0.56	Moderately relevant
47	Organic manure preparation to maintain soil fertile	3.49	0.62	Moderately relevant
48	Application of organic manure to maintain soil fertility	3.37	0.70	Moderately relevant
49	Adoption of IAKP for soil erosion control	3.45	0.79	Moderately relevant
	Ethno – veterinary medicine			
50	Identification of livestock pests and diseases in a given area	3.58	0.59	Highly relevant
51	Identification and documentation of plant species and concoctions for controlling and curing of livestock pests and disease	3.38	0.86	Moderately relevant
52	Utilization of indigenous methods to prepare livestock drugs	3.33	0.89	Moderately relevant
	Cluster Mean	**3.41**	**0.69**	**Moerately relevant**

From Table 5 above, 15 items had their means ranging from 3.50 to 3.82 and they fell within the response category of highly relevant while other 36 items had their means ranging from 3.08 to 3.49 and fell within the response category of moderately relevant. The result indicated that the respondents agreed that all the items stated above were the relevant content of IAKP to be integrated into NCE Agricultural Education curriculum. These include: concept of IK and IAKP, characteristics of IAKP, importance of IAKP, constraints to the utilization of IAKP by farmers and documentation of IAKP by farmers. Other contents include: utilizing IAKP in crop production (site selection, clearing, cultivation, selection of planting materials weeding, manure application, diseases and pest control, harvesting, processing and storage), livestock production (selection of breeds, housing, feeding, routine management practices and pests and disease control), utilization of specific plant species for soil water conservation, organic matter preparation, application of organic manure, adoption of IAKP for soil erosion control. More so, identification of livestock pests and diseases in a given area, identification and documentation of plant species and concoctions for curing livestock diseases and utilization of indigenous methods to prepare livestock drugs were the relevant IAKP contents for achieving the objectives of IAKP in NCE Agricultural Education curriculum.

The standard deviation (SD) of the items ranged from 0.50 to 0.89, indicating that the respondents (Agricultural Education Lecturers and Extension agents) were not very far from the mean of one another in their responses. This helped to add value to the mean.

Hypothesis 2

There is no significant difference in the mean responses of Lecturers and Extension Agents on the content that should be utilized to achieve the IAKP objective to be integrated into NCE Agricultural Education Curriculum.

Data showing the result of the test of hypothesis 2 are contained in Table 6.

Table 6: t-test analysis of the mean responses of lecturers and extension agents on the contents for achieving the IAKP objectives to be integrated into NCE Agricultural Education Curriculum.

S/No		Lecturers N = 85		Extension agents N=182				
		$\overline{\times}_1$	SD_1	$\overline{\times}_2$	SD_2	t-cal	t-tab	Decision
General concepts								
1	Explain the concept of IK and IAKP	3.84	0.43	3.82	0.53	0.25	1.96	NS
2	Discuss the characteristics of IAKP	3.65	0.61	3.52	0.57	1.69	1.96	NS
3	Outline and discuss the importance of IAKP for sustainable agricultural productions	3.71	0.53	3.64	0.48	1.04	1.96	NS
4	Outline and discuss the constraints to the utilization of IAKP by farmers	3.62	0.57	3.63	0.50	0.12	1.96	NS
5	Document IAKP for preservation	3.53	0.61	3.50	0.65	0.35	1.96	NS
Crop production: Yam								
6	Site selection	3.40	0.71	3.21	0.70	1.99	1.96	S
7	Clearing	3.28	0.78	3.07	0.65	2.29	1.96	S
8	Cultivation	3.42	0.64	3.18	0.59	3.08	1.96	S
9	Selection of planting materials	3.39	0.74	3.14	0.81	2.41	1.96	S
10	Weeding	3.27	0.77	3.18	0.63	1.05	1.96	NS
11	Manure application	3.40	0.71	3.46	0.50	3.20	1.96	S
12	Disease and pest control	3.42	0.82	3.54	0.83	0.05	1.96	NS
13	Harvesting	3.27	0.74	3.18	0.75	0.96	1.96	NS
14	Processing	3.32	0.79	3.31	0.94	0.84	1.96	NS
15	Storage	3.48	0.76	3.60	0.66	1.33	1.96	NS
Maize production								
16	Site selection	3.34	0.81	3.41	0.65	0.70	1.96	NS
17	Clearing	3.35	0.78	3.42	0.51	0.87	1.96	NS
18	Cultivation	3.47	0.70	3.31	0.59	1.91	1.96	NS
19	Selecting of planting materials	3.31	0.81	3.16	0.76	1.42	1.96	NS
20	Weeding	3.25	0.84	3.01	0.85	2.16	1.96	S
21	Manure application	3.38	0.72	3.55	0.49	2.27	1.96	S
22	Disease and pest control	3.40	0.75	3.57	0.63	1.93	1.96	NS
23	Harvesting	3.39	0.72	3.16	0.81	2.15	1.96	S
24	Processing	3.41	0.67	3.49	0.63	0.90	1.96	NS
25	Storage	3.47	0.64	3.51	0.63	0.48	1.96	NS
Cassava production.								
26	Site selection	3.36	0.80	3.42	0.67	0.56	1.96	NS
27	Clearing	3.32	0.72	3.27	0.52	0.61	1.96	NS
28	Cultivation	3.40	0.65	3.33	0.54	0.91	1.96	NS
29	Selecting of planting materials	3.36	0.70	3.36	0.62	0.08	1.96	NS
30	Weeding	3.29	0.72	3.12	0.64	1.97	1.96	S
31	Manure application	3.39	0.72	3.35	0.59	0.43	1.96	NS
32	Disease and pest control	3.46	0.76	3.16	0.93	2.58	1.96	S
33	Harvesting	3.33	0.74	3,73	0.14	1.14	1.96	NS
34	Processing	3.54	0.78	3.53	0.89	0.12	1.96	NS
35	Storage	3.49	0.76	3.60	0.80	1.01	1.96	NS
Livestock production: Goat								
36	Selection of breeds	3.40	0.77	3.50	0.63	1.11	1.96	NS
37	Housing	3.34	0.78	3.55	0.69	2.19	1.96	S
38	Feeding	3.36	0.75	3.55	0.61	2.11	1.96	S
39	Routine management practices	3.41	0.69	3.47	0.67	0.62	1.96	NS
40	Pest and disease control	3.41	0.71	3.48	0.67	0.79	1.96	NS
Poultry production								
41	Selection of breeds	3.40	0.75	3.34	0.85	0.59	1.96	NS
42	Housing	3.31	0.75	3.55	0.63	2.74	1.96	S
43	Feeding	3.39	0.72	3.55	0.69	1.80	1.96	NS
44	Routine management practices	3.36	0.73	3.41	0.75	0.42	1.96	NS
45	Pest and disease control	3.38	0.77	3.27	0.91	0.89	1.96	NS
Soil conservation								
46	Utilize specific plant species for soil water conservation	3.47	0.62	3.44	0.51	0.42	1.96	NS
47	Prepare organic manure to maintain soil fertility	3.52	0.64	3.47	0.61	0.55	1.96	NS
48	Apply organic manure to maintain soil fertility	3.54	0.56	3.29	0.74	2.75	1.96	S
49	Adopt IAKP for soil erosion control	3.49	0.66	3.43	0.70	0.71	1.96	NS
Ethno-veterinary								
50	Identify livestock pests and disease in a given area	3.51	0.71	3.61	0.51	1.35	1.96	NS
51	Identify and document plant species and concoctions for controlling and curing livestock pests and diseases	3.47	0.78	3.34	0.88	1.21	1.96	NS
52	Utilize indigenous methods to prepare livestock drugs	3.42	0.80	3.28	0.92	1.22	1.96	NS

Note $\overline{\times}_1$ = Mean 1, $\overline{\times}_2$ = Mean 2, SD_1= Standard Deviation SD_2 = Standard Deviation 2, Degree of Freedom = 265, NS = Not significant, S = Significant.

From Table 6 above , the result of the analysis of hypothesis 2 showed that 38 items had their calculated t- values ranging from 0.12 to 1.91 which were less than 1.96 at 0.05 level of significance and were upheld for the items where as 14 items had their calculated t-values ranging from 1.97 to 2.75 which were greater than 1.96 at 0.05 level of significance showing that there are significant differences on the responses of Lecturers and Extension agents on the content for achieving the IAKP objectives to be integrated into NCE Agricultural Education Curriculum for the 14 items. This implied that Agricultural Education Lecturers and Extension agents had the same view on the content for achieving the IAKP objectives to be integrated into NCE Agricultural curriculum for the 38 items stated in table 6 where as the mean responses of the respondents on the other 14 items differed significantly. This implied that their opinion vary on those items.

Table 7: Cluster analysis of t-test on the mean responses of lecturers and Extension agents on the content for achieving IAKP objectives in NCE Agricultural Education curriculum.

$\bar{\times}_1$	**SD_1**	$\bar{\times}_2$	**SD_2**	t-cal	t-tab	Df	Remarks
3.43	0.21	3.10	0.30	3.83	1.96	265	Significant

$\bar{\times}_1$ = Mean I, $\bar{\times}_2$ = SD_1 = Standard Deviation I, SD_2 = Standard Deviation 2, Df =Degree of freedom, t-cal = t-calculated, t-tab = t-table

From the Table above, the result of the cluster t- test showed that t-calculated was 3.38 which is greater than the t-tab of 1.96 0.05 level of significance and 265 degree of freedom. This implied that the views of Lecturers and Extension Agents differ significantly on the content for achieving IAKP objectives in NCE Agricultural Education Curriculum. Therefore, the null hypothesis was rejected.

Research Question 4

What are the teaching methods to be adopted in teaching IAKP in NCE Agricultural Education curriculum?

The data for answering research question 4 above are presented in table 8.

Table 8: Mean ratings of the responses of Lecturers and Extension Agents on the teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum.

s/n	Questionnaire items	$\bar{X}$	SD	Remarks
	General concepts of IAKP			
1	Lecture	3.34	0.81	Moderately relevant
2	Discussion	3.51	0.68	Highly relevant
3	Guided discovery	3.51	0.69	Highly relevant
4	Project	3.58	0.64	Highly relevant
5	Demonstration	3.75	0.60	Highly relevant
6	Problem solving	3.68	0.62	Highly relevant
7	Library search	3.23	0.88	Moderately relevant
8	Guest speaker/resource person	3.28	0.88	Moderately relevant
9	Brain storming	3.17	0.77	Moderately relevant
10	Field trip/excursion	3.55	0.56	Highly relevant
11	Experimental method	3.67	0.62	Highly relevant
12	Task analysis	3.08	0.86	Moderately relevant
	Crop production			
13	Lecture	3.24	0.86	Moderately relevant
14	Discussion	3.45	0.71	Moderately relevant
15	Guided discovery	3.54	0.58	Highly relevant
16	Project	3.58	0.61	Highly relevant
17	Demonstration	3.70	0.52	Highly relevant
18	Problem solving	3.63	0.55	Highly relevant
19	Field trip	3.47	0.61	Moderately relevant
20	Experimental method	3.37	0.72	Moderately relevant
21	Task analysis	3.03	0.94	Moderately relevant
	Livestock production			
22	Lecture	3.32	0.75	Moderately relevant
23	Discussion	3.50	0.58	Highly relevant
24	Guided discovery	3.41	0.62	Moderately relevant
25	Project	3.61	0.58	Highly relevant
26	Demonstration	3.74	0.55	Highly relevant
27	Problem solving	3.72	0.52	Highly relevant
28	Field trip	3.55	0.64	Highly relevant
29	Experimental method	3.58	0.67	Highly relevant
30	Task analysis	2.94	0.89	Moderately relevant
	Soil conservation			
31	Lecture	3.36	0.72	Moderately relevant
32	Discussion	3.47	0.57	Moderately relevant
33	Guided discovery	3.48	0.69	Moderately relevant
34	Project	3.38	0.69	Moderately relevant
35	Demonstration	3.44	0.68	Moderately relevant
36	Problems solving	3.43	0.61	Moderately relevant
37	Field trip	3.27	0.79	Moderately relevant
38	Experimental method	3.21	0.68	Moderately relevant
39	Task analysis	3.07	0.95	Moderately relevant
	Ethno – veterinary medicine			
40	Lecture	3.79	0.71	Highly relevant
41	Discussion	3.39	0.76	Moderately relevant
42	Guided discovery	3.42	0.70	Moderately relevant
43	Project	3.61	0.56	Highly relevant
44	Demonstration	3.53	0.64	Highly relevant
45	Problem solving	3.51	0.53	Highly relevant
46	Field trip	3.32	0.62	Moderately relevant
47	Experimental method	3.22	0.72	Moderately relevant
48	Task analysis	2.78	0.99	Moderately relevant
	Cluster Mean	**3.42**	**0.68**	**moderately relevant**

Note $\bar{X}_1$ = Mean 1, $\bar{X}_2$ = Mean 2, SD_1= Standard Deviation SD_2 = Standard Deviation 2, Degree of Freedom = 265, NS = Not significant, S = Significant.

Table 8 had 48 items on the teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum. Twenty-one items had their means ranging from 3.50 to 3.79 which fell within the response category of highly relevant. Whereas the other 27 items fell within the response category of moderately relevant because they had their means ranged from 2.74 to 3.47. The results above indicated that the respondents agreed that the items listed in Table 8 above were the relevant teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum. These methods include: lecture, discussion, guided discovery, project, demonstration, problem solving, field trip, experimental method and task analysis.

Also, the standard deviation of the items ranged from 0.52 to 0.99 indicating that the respondents were not too far from the mean of one another in their responses and this equally add value to the mean of the items.

Hypothesis 3

There is no significant difference in the mean responses of Lecturers and Extension Agents on the methods to adopt in teaching IAKP in NCE Agricultural Education curriculum.

Data showing the result of test of hypothesis 3 above are presented in Table 9.

Table 9: t-test analysis of the mean responses of lecturers and extension agents on the methods to adopt in teaching IAKP in NCE Agricultural Education Curriculum

		Lecturers = 85		Extension agents =182				
S/N	**Questionnaire items**	$\overline{\times}_1$	**SD_1**	$\overline{\times}_2$	**SD_2**	**t-cal**	**t-tab**	**Decision**
	General concepts							
1	Lecture	3.24	0.92	3.38	0.76	1.65	1.96	NS
2	Discussion	3.48	0.73	3.52	0.65	3.40	1.96	S
3	Guided discovery	3.54	0.64	3.50	0.71	0.63	1.96	NS
4	Project	3.66	0.47	3.54	0.69	1.79	1.96	NS
5	Demonstration	3.82	0.38	3.71	0.67	4.60	1.96	S
6	Problem solving	3.74	0.51	3.65	0.66	5.63	1.96	S
7	Library search	3.31	0.91	3.20	0.87	2.01	1.96	S
8	Guest speaker/resource person	3.28	0.84	3.27	0.90	1.89	1.96	NS
9	Brain storming	3.27	0.80	3.13	0.74	0.65	1.96	NS
10	Field trip/excursion	3.59	0.62	3.53	0.52	3.20	1.96	S
11	Experimental method	3.67	0.66	3.67	0.60	2.24	1.96	S
12	Task analysis	3.19	0.86	3.03	0.86	1.07	1.96	NS
	Crop production							
13	Lecture	3.12	0.93	3.29	0.82	0.02	1.96	NS
14	Discussion	3.35	0.73	3.50	0.70	0.88	1.96	NS
15	Guided discovery	3.47	0.64	3.57	0.55	1,64	1,96	NS
16	Project	3.54	0.60	3.60	0.61	0.12	1.96	NS
17	Demonstration	3.66	0.52	3.72	0.52	0.60	1.96	NS
18	Problem solving	3.52	0.66	3.69	0.48	0.17	1.96	NS
19	Library search	3.52	0.62	3.45	0.60	1.21	1.96	NS
20	Guest speaker/resource person	3.53	0.66	3.30	0.74	0.88	1.96	NS
21	Brain storming	3.12	0.86	2.99	0.97	0.81	1.96	NS
	Livestock production							
22	Lecture	3.21	0.86	3.37	0.68	0.44	1.96	NS
23	Discussion	3.33	0.69	3.58	0.49	0.02	1.96	NS
24	Guided discovery	3.38	0.72	3.43	0.56	1.71	1.96	NS
25	Project	3.52	0.62	3.65	0,55	0.13	1.96	NS
26	Demonstration	3.52	0.68	3.84	0.44	1.50	1.96	NS
27	Problem solving	3.47	0.64	3.84	0.40	2.43	1.96	S
28	Library search	3.44	0.71	3.60	0.60	2.88	1.96	S
29	Guest speaker/resource person	3.47	0.70	3.64	0.65	1.87	1.96	NS
30	Brain storming	2.99	0.96	2.91	0.88	2.08	1.96	S
	Soil conservation							
31	Lecture	3.15	0.91	3.45	0.58	1.22	1.96	NS
32	Discussion	3.35	0.68	3.52	0.51	2.25	1.96	NS
33	Guided discovery	3.36	0.73	3.46	0.66	0.69	1.96	NS
34	Project	3.38	0.74	3.38	0.64	1.84	1.96	NS
35	Demonstration	3.39	0.74	3.47	0.64	1.84	1.96	NS
36	Problem solving	3.34	0.64	3.47	0.59	0.63	1.96	NS
37	Library search	3.28	0.79	3.327	0.80	0.53	1.96	NS
38	Guest speaker/resource person	3.25	0.78	3.19	0.63	2.01	1.96	S
39	Brain storming	3.08	0.96	3.06	0.94	0.41	1.96	NS
	Ethno-veterinary medicine							
40	Lecture	3.33	0.90	3.85	0.87	0.37	1.96	NS
41	Discussion	3.33	0.79	3.42	0.74	1.10	1.96	NS
42	Guided discovery	3.36	0.76	3.44	0.66	0.56	1.96	NS
43	Project	3.59	0.56	3.62	0.56	1.32	1.96	NS
44	Demonstration	3.53	0.71	3.53	0.60	0.39	1.96	NS
45	Problem solving	3.42	0.60	3.54	0.49	1.65	1.96	NS
46	Library search	3.33	0.71	3.32	0.57	1.31	1.96	NS
47	Guest speaker/resource person	3.32	0.79	3.18	0.68	0.01	1.96	NS
48	Brain storming	2.99	0.91	2.68	1.00	0.53	1.96	NS

Note $\overline{\times}_1$ = Mean 1, $\overline{\times}_2$ = Mean 2, SD_1= Standard Deviation SD_2 = Standard Deviation 2, Degree of Freedom = 265, NS = Not significant, S = Significant.

Table 9 above revealed that 39 items had their calculated t-values ranging from 0.02 to 1.89 which were less than 1.96 at 0.05 level of probability and the null hypothesis were upheld for those items while items 2, 5, 6, 7, 10, 27, 28, 30 and 38 had their t-calculated ranging from2.01 to 3.43 which were greater than 1.96 at 0.05 level of significance indicating that the responses of extension agents and lecturers differ on those items. The result above implied that Lecturers and Extension Agents opined that the teaching methods stated above were relevant in teaching IAKP in NCE Agricultural Education Curriculum.

Table 10: Cluster analyses of t-test on the mean responses of lecturers and Extension agent on methods to adopt in teaching IAKP in NCE Agricultural Education curriculum.

$\bar{\times}_1$	**SD_1**	$\bar{\times}_2$	**SD_2**	t-cal	t-tab	df	Remarks
3.40	0.23	2.88	1.24	2.63	1.96	265	Significant

$\bar{\times}_1$ = Mean I, $\bar{\times}_2$ =, SD_1 = Standard Deviation I, SD_2 = Standard Deviation 2,
df =Degree of freedom, t-cal = t-calculated, t- tab =t-table

From the Table above, the result of the cluster t- test showed that t-calculated was 2.63 which is greater than the t-tab of 1.96 at 0.05 level of significance and 265 degree of freedom. This implied that the views of Lecturers and Extension Agents differed significantly on the methods to adopt for teaching IAKP in NCE Agricultural Education Curriculum. Therefore, the null hypothesis was rejected.

Research Question 5

What are the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum?

The data for answering research question 5 were presented in Table 11:

Table 11: Mean ratings of the responses of the respondents on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum.

S/N	Questionnaire Items	$\bar{\times}$	SD	Remarks
	General concepts			
1	Interview	3.61	0.61	Highly relevant
2	Questionnaire	3.55	0.74	Highly relevant
3	Observational schedule	3.47	0.74	Moderately relevant
4	Essay type question	3.40	0.76	Moderately relevant
5	Objective type question	3.41	0.70	Moderately relevant
6	Anecdotal records	3.13	0.83	Moderately relevant
7	Soicometric technique	2.85	0.85	Moderately relevant
8	Performance test	3.06	0.92	Moderately relevant
	Crop production			
9	Interview	3.37	0.66	Moderately relevant
10	Questionnaire	3.34	0.73	Moderately relevant
11	Observational schedule	3.40	0.66	Moderately relevant
12	Essay type question	3.17	0.75	Moderately relevant
13	Objective type question	3.22	0.63	Moderately relevant
14	Anecdotal records	2.99	0.88	Moderately relevant
15	Soicometric technique	2.97	1.03	Moderately relevant
16	Performance test	3.09	0.96	Moderately relevant
	Livestock production			
17	Interview	3.35	0.68	Moderately relevant
18	Questionnaire	3.40	0.72	Moderately relevant
19	Observational schedule	3.42	0.69	Moderately relevant
20	Essay type question	3.25	0.70	Moderately relevant
21	Objective type question	3.23	0.83	Moderately relevant
20	Anecdotal records	2.92	0.80	Moderately relevant
22	Soicometric technique	2.87	0.91	Moderately relevant
23	Performance test	3.15	0.88	Moderately relevant
24	Interview			
	Soil conservation			
25	Interview	3.35	0.78	Moderately relevant
26	Questionnaire	3.48	0.62	Moderately relevant
27	Observational schedule	3.59	0.57	Highly relevant
28	Essay type question	3.34	0.76	Moderately relevant
29	Objective type question	3.37	0.67	Moderately relevant
30	Anecdotal records	3.15	0.66	Moderately relevant
31	Soicometric technique	2.88	0.97	Moderately relevant
32	Performance test	3.10	0.99	Moderately relevant
	Ethno – veterinary medicine			
33	Interview	3.51	0.69	Highly relevant
34	Questionnaire	3.55	0.69	Highly relevant
35	Observational schedule	3.54	0.64	Highly relevant
36	Essay type question	3.40	0.76	Moderately relevant
37	Objective type question	3.48	0.69	Moderately relevant
38	Anecdotal records	3.17	0.83	Moderately relevant
39	Sociometric technique	2.89	0.99	Moderately relevant
40	Performance test	3.13	0.89	Moderately relevant
	Cluster Mean	**3.26**	**0.77**	**Moderately relevant**

Table 11 above showed the mean ratings of Lecturers and the Extension Agents on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Programme. It had forty (40) items of which item 1, 2, 27, 33, 34 and 35 had their means from 3.50 and above and fell within the response category of highly relevant while the rest of 24 items had their mean ranging from 2.35 to 3.48 which fell within the response category of moderately relevant. This showed that the respondents agreed that interview, questionnaire, observational schedule, essay type question, objective type question, anecdotal records, sociometric technique and performance test were the relevant evaluation methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum.

On the standard deviation scores, there was a range of 0.61 to 0.99 indicating that the respondentsô mean ratings are not far from each other. However, items 15 had standard deviation of 1.03 indicating that there was a high variability between the respondents score

Hypothesis 4

There is no significant difference in the mean responses of Lecturers and Extension Agents on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum.

Data showing the result of test of hypothesis of are presented in table 12

Table 12: t-test analysis of the mean responses of Lecturers and Extension Agents on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum

S/N	Questionnaire items	Lecturers N = 85		Extension agents N = 182				
		$\overline{\times}_I$	SD_1	$\overline{\times}_I$	SD_2	t-cal	t-tab	Decision
	General concepts							
1	Interview	3.46	0.83	3.69	0.47	2.88	1.96	S
2	Questionnaire	3.42	0.82	3.60	0.69	1.87	1.96	NS
3	Observational schedule	3.33	0.81	3.53	0.71	2.08	1.96	S
4	Essay type question	3.32	0.85	3.44	0.72	1.22	1.96	NS
5	Objective type question	3.27	0.79	3.48	0.65	2.25	1.96	S
6	Anecdotal records	3.08	0.86	3.16	0.83	0.69	1.96	NS
7	Sociometric technique	2.29	0.90	2.82	0.84	0.83	1.96	NS
8	Performance test	3.21	0.90	2.99	0.92	1.84	1.96	NS
	Crop production							
9	Interview	3.33	0.76	3.38	0.61	0.63	1.96	NS
10	Questionnaire	3.31	0.82	3.36	0.96	0.53	1.96	NS
11	Observational schedule	3.28	0.73	3.46	0.62	2.01	1.96	S
12	Essay type question	3.20	0.75	3.16	0.75	0.41	1.96	NS
13	Objective type question	3.20	0.72	3.23	0.59	0.37	1.96	NS
14	Anecdotal records	2.91	0.93	3.03	0.85	1.10	1.96	NS
15	Sociometric technique	2.92	1.00	2.99	1.04	0.56	1.96	NS
16	Performance test	3.20	0.97	3.03	0.95	1.32	1.96	NS
	Livestock production							
17	Interview	3.38	0.75	3.34	0.65	0.39	1.96	NS
18	Questionnaire	3.29	0.87	3.45	0.63	1.65	1.96	NS
19	Observational schedule	3.34	0.76	3.46	0.66	1.31	1.96	NS
20	Essay type question	3.25	0.74	3.25	0.69	0.01	1.96	NS
21	Objective type question	3.12	0.84	3.23	0.61	1.24	1.96	NS
22	Anecdotal records	2.93	0.89	2.91	0.75	0.16	1.96	NS
23	Sociometric technique	3.21	0.86	3.12	0.89	0.78	1.96	NS
24	Performance test	3.21	0.86	3.12	0.89	0.78	1.96	NS
	Soil conservation							
25	Questionnaire	3.25	0.87	3.40	0.74	1.44	1.96	NS
26	Observational schedule	3.35	0.81	3.54	0.49	2.36	1.96	NS
27	Essay type question	3.53	0.58	3.62	0.57	1.13	1.96	NS
28	Objective type question	3.34	0.81	3.34	0.74	0.01	1.96	NS
29	Anecdotal records	3.27	0.79	3.42	0.59	1.68	1.96	NS
30	Sociometric technique	3.02	0.87	3.21	0.70	1.85	1.96	NS
31	Performance test	2.96	0.94	2.84	0.98	1.01	1.96	NS
32	Interview	3.24	0.68	3.04	1.00	1.50	1.96	NS
	Ethno – veterinary medicine							
33	Interview	3.44	0.79	3.54	0.62	1.20	1.96	NS
34	Questionnaire	3.41	0.86	3.62	0.59	2.25	1.96	S
35	Observational schedule	3.44	0.66	3.59	0.63	1.81	1.96	NS
36	Essay type question	3.34	0.82	3.43	0.73	0.86	1.96	NS
37	Objective type question	3.27	0.80	3.57	0.60	3.38	1.96	S
38	Anecdotal records	3.15	0.89	3.18	0.81	0.25	1.96	NS
39	Sociometric technique	3.06	0.95	2.81	1.00	1.93	1.96	NS
40	Performance test	3.24	0.85	3.08	0.91	1.30	1.96	NS

Note: $\overline{\times}_I$ = Mean 1, SD_1 = Standard Deviation, $\overline{\times}_2$ = Mean 2, SD_2 = Standard Deviation 2, Degree of freedom = 265, Not significant = NS, Significant = S.

The result of the test of hypothesis in Table 12 above showed that all the items had their t-calculated ranging from 0.01 to 1.93 which were less than 1.96 at 0.05 level of significant and

265 degree of freedom except items 1, 3, 11, 26, 34 and 37 which had their t-calculated ranging from 2.08 to 3.38 which were greater than 1.96 at 0.05 level of significance. Therefore the null hypothesis was upheld for all other items except items 1, 3, 11, 26, 34 and 37 indicating that mean responses of Lecturers and Extension Agents differed on the evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education curriculum on items 1, 3, 11, 26, 34 and 37.This implies that the respondents opined that the evaluation methods stated above were relevant for assessing the objectives of IAKP in NCE Agricultural Education Curriculum.

Table 13: Cluster analyses of t-test on the mean responses of Lecturers and Extension agent on evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education curriculum

$\bar{\times}_1$	**SD₁**	$\bar{\times}_2$	**SD₂**	t-cal	t-tab	df	Remarks
3.47	0.26	3.20	0.63	1.33	1.96	265	Not Significant

Note: $\bar{\times}_1$ = Mean I, $\bar{\times}_2$ =.SD_1 = Standard Deviation I, SD_2 = Standard Deviation 2, df =Degree of freedom, t-cal = t-calculated, t- tab =t-table

From Table 13 above, the t ï test cluster of the items showed that the t ï calculated was 1.33 which was less than the t-table value of 1.96 at .05 levels of significance and 265 degree of freedom. This showed that there was no significant difference on the mean responses of Lecturers and Extension Agents on the evaluation methods to be adopted for assessing IAKP objectives in NCE Agricultural Education Curriculum. Therefore, the null hypothesis was upheld for hypothesis 4.

Research Question 6

What are the courses in which IAKP could be integrated in NCE Agricultural Education curriculum?

The data for answering research question 6 was presented in Table 14.

Table 14: Mean ratings of the responses of the respondents on the existing courses in which IAKP could be integrated in NCE Agricultural Education curriculum.

S/N	Questionnaire items	$\bar{\times}$	SD	Remarks
1	Integrating the concept of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP into: introduction to Agriculture (AGE III)	3.58	0.66	Strongly agreed
2	Integrating IAKP in land preparation, crop propagation and cultural practices into - Introduction to crop production (AGE 128)	3.77	0.43	Strongly agreed
3	-Arable crop production (AGE 121)	3.38	0.39	Agreed
4	-Tree crop production (AGE 211)	3.46	0.71	Agreed
5	Integrating IAKP in crop protection into - Principles of crop protection (AGE 223)	3.60	0.67	Strongly agreed
6	Integrating IAKP in livestock production into: - Livestock production I (AGE 225)	3.60	0.61	Strongly agreed
7	-Livestock production II (AGE 311)	3.55	0.58	Strongly agreed
8	Integrating IAKP in poultry into: - Poultry production (AGE 212)	3.55	0.63	Strongly agreed
9	Integrating IAKP in soil conservation into: - Soil fertility management (AGE 222)	3.70	0.48	Strongly agreed
10	Integrating documentation of IAKP into: - Youth organization in Agriculture (AGE 123)	3.59	0.62	Strongly agreed
11	Integrating ethno-veterinary medicine into; - Animal health (AGE 322)	3.54	0.64	Strongly agreed
12	Integrating IAKP for sustainable Agricultural productions into: - Environmental Education in Agriculture (AGE 321)	3.68	0.51	Strongly agreed
13	-Practical Agriculture (AGE 127)	3.61	0.65	Strongly agreed
	Cluster Mean	**3.62**	**0.58**	**Strongly agreed**

From Table 14 above all the item had their mean ranging from 3.46 to 3.83 and fell within the responses category of strongly agree and agreed. This indicates that the respondents (Lecturers of Agricultural Education in NCE and Extension Agents) agreed that the items stated in the Table were the courses in which IAKP could be integrated in NCE Agricultural Education curriculum. This implies that concepts of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP could be integrated into: introduction to Agriculture (AGE 111), IAKP in land preparation, crop propagation and cultural practices into: Introduction to crop production (AGE 128), Arable crop production (AGE 121) and Tree crop production (AGE 211), IAKP in crop protection into: Principles of crop protection (AGE 223). IAKP in livestock production into: Livestock production I (AGE 225) and Livestock production II (AGE 311).

Also, Integrating IAKP in poultry into: Poultry Production(AGE 212). IAKP in soil conservation into: soil fertility management(AGE 222),documentation of IAKP into Youth organization in Agriculture(AGE 123),ethno-veterinary medicine into :Animal health(AGE 223) and integrating IAKP for sustainable agricultural productions into: Environmental Education in Agriculture(AGE 321)and Practical Agriculture(AGE 127).

Again the scores of standard deviation showed that the mean rating of the respondents were not too far from each other and this help to add value to the mean.

Findings of the study

The findings of the study which were organized on the basis of each research question were presented below:

A. IAKP utilized by farmers in Agricultural production include:

Crop production:

Site selection

Yam

- Land that is fallowed for at least two years
- Land that is free from shade
- Land that has adequate sunlight
- Soil that is gummy and dark
- Soil where earthworm is found

Cassava

- Fallowed land
- Well drained soil
- Land that is free from shade

- Land that has adequate sunlight

Maize

- Well drained soil
- Soil that is dark in colour
- Land that is free from shed

Clearing:

Yam

- Slashing with cutlass/hoes
- Burning in heaps to produce ash

Cassava

- Slashing with cutlass/hoes
- Burning in heaps to produce ash

Maize

- Slashing with cutlass/hoes
- Burning in heaps to produce ash

Cultivation

Yam

- Pits are made, kitchen refuse and other vegetable materials are dumped into the pit which will later buried to make mounds
- Planting on ridges

Cassava

- Mounds
- Ridges

Maize

- Ridges
- Non ï tilth

Selection of planting materials for cultivation

Yam

- Those that sprout before planting
- Those that are free from pests and diseases
- Those that are free from bruises
- Use of head pieces of yam for planting
- Planting small whole yam
- Practising yam minisette technique.

Cassava

- Use of stem cutting for propagation
- Use of healthy stems
- Use of stems with enough nodes.

Maize

- Selection of big, sized grains for cultivation
- Selection of grains that are free from weevil/pests
- Pre-soaking of grains in water and those that floats are removed.

Weeding

Yam

- Hand pulling of weeds and hoeing
- Suppressing weeds using mulch material

- Practicing shifting cultivation and fallowing
- Practicing inter-cropping

Cassava

- Hand pulling of weeds and hoeing
- Slashing weeds with cutlass
- Uprooting and burning parasitic weeds like string

Maize

- Hand pulling of weeds and hoeing

Manure application

Yam

- Use of compost/decay organic matter
- Use of kitchen refuse

Cassava

- Use of compost and farmyard manure

Maize

- Use of compost/farmyard manure

Diseases and pests control

- Spreading/dusting planting materials with ash to control pests.
- Soaking planting materials kin *occimum Africana* (Nchuanwu) to reduce pests attack.
- Practising farm sanitation
- Use of local cultural that is resistant to pests and diseases.
- Hand picking of pests like beetle

- Practising shifting cultivation and fallowing
- Practising mixed cropping
- Use of bird scare against bush fowl (Okwa)
- Early planting

Cassava

- Early planting
- Use of animal urine and excretes to ward off pests
- Dusting the planting materials with ash
- Hand picking of caterpillars and the like
- Sanitation of the farm
- Mixed cropping
- Shifting cultivation/fallowing
- Use of resistant local cultivar.
- Selection of clean planting material

Maize

- Selection of clean planting materials
- Use of resistant local cultivar
- Use of ash to control weevil/other insects
- Uprooting/removal of infected plants
- Early planting

Harvesting

Yam

- Harvest when yam plant die
- Practising first and second harvest for ware yams
- Harvesting is done by hand to avoid inflicting bruises on the tuber

Cassava

- Harvest when matured depending on variety
- Harvest with hoe or cutlass

Maize

- Use of cutlass/sickle

Processing

Yam

- Cutting off attached roots with knife
- Sorting of bruised tubers from the heap

Cassava

- Processed into garri
- Processed and dried for flour
- Soaking in water and allow to rett for foo foo (Akpu)

Maize

- Removal of husks by hand
- Sun drying of cobs
- Smoking over the fire place
- Ground and processed into flour

Storage

Yam

- Store in barns under shed
- Store under well ventilated thatched house on a platform

Cassava

- Foo-foo (Akpu) can be stored in a basin with salt and lime sprayed on top of it.
- Can store underground in the field
- Garri and flour can be stored in bags

Maize

- Hanging over the fire place
- Hanging in a well ventilated thatch house
- Store in bags fumigated with dry pepper

IAKP Utilized by farmers in livestock production selection of breeds

Goat

- Big body size
- Large litter size
- Broad tails
- Fine wools

Chicken

- Plumage colour of the birds
- Weight of the chicken (Heavy breeds)
- Naked-neck breeds
- Frizzled feather chickens are selected by healers.

Housing

Goat

- Kept under thatched house
- Kept under shed
- Allowed to roam about inside the compound

Chicken

- Kept in a basket
- Sleep on the fence after roaming about
- Kept in a corner of a kitchen

Feeding

Goat

- Feed on residue from processed grains
- Feed with kitchen wastes
- Feed on browse plants other fodder
- Feed on harvest and house waste

Chicken

- Feed on residue from processed grains
- Feed on kitchen wastes
- Pecking on vegetable/leaves.

Routine management practices

Goat

- Castrating with sharp razor blade by cutting the vein that leads to testicles
- Bitter leaf, Siam weeds and palm oil are used for medication and stoppage of bleeding

- Identification of animals are done by ear notching, tattooing, giving of marks and use of tags

Chicken

- Identified by the use of rings/ribbons or piece of clothes tied to the wings
- Detoeing

Pests and diseases control

Goat

- As in ethno-veterinary medicine utilized by farmers

Chicken

- As in ethno-veterinary medicine utilized by farmers

IAKP utilized by farmers in soil conservation

Soil water conservation

- Mulching with dry grasses, palm fronds and leaves
- Spreading of compost manure and animal dung
- Practising of nursery under shed
- Multiple cropping
- Planting of cover crops

Soil fertility conservation

- Applying compost manure
- Use of animal dung
- Practising crop rotation
- Shifting cultivation
- Cover cropping and planting of legumes

- Multiple cropping
- Inter cropping

Soil erosion control

- Practicing no tilth/zero tillage
- Construction of bunds to wage run off
- Making big mounds to reduce run off and flooding
- Planting of trees like bamboo in erosion prone areas
- Planting of perennial vegetation on field bunds
- Covering/depositing sand and stone on erosion sites.

Ethno- veterinary medicine utilized by farmers

Scabies in livestock (sheep and goat)

- Use of palm kernel oil
- Mixed kerosene with ash and rob the animal

Mites attack and Coccidiosis in poultry

- Use of palm oil
- Use of ground alligator pepper (*Afomonam melegueta*) mixed with feed.
- Mixture of ash and ground pepper

Cold and cough in livestock

- Use of crushed bitter kola hot with citrus lemon grass (*cymbogon citrates*) in drinking water

Diarrhea

- Use of garlic (*Allium sativum*) mixed with the feed
- Use of potato leaves

Internal worms in goat/poultry

- Use of thyme (*Thymus valgaris*)
- Use of hot leaves (*Occimum africana*)
- Use of potato leaves
- Use of paw-paw seeds

Stoppage of bleeding in livestock

- Use of siam weed (*Chromolaena odoratum*)
- Use of bitter leaf (*Vernonia amygdalina*)
- Use of pulp of (*Eleasis guinensis*)
- Use of pulp of coconut (*Cocus nucifera*)

Poison

- Use of red palm oil

Disengagement of placenta and other reproduction problem

- Use of cowpea leaves and salt
- Use of potato leaves
- Use of (Ijikere) (*Spondias mombin*)
- Use of ogirishi (*Newbouldia laevis*)

Ecto- parasites (tick, lice etc)

- Use of palm oil
- Hand picking
- Pricking the ecto-parasite (tick) with sharp object

B. Specific objectives of IAKP for integration into NCE Agricultural Education Curriculum included:

a. Define the concept of IK and IAKP;

b. Discuss the characteristics of IAKP;

c. Appreciate the values of IAKP for sustainable Agricultural productions;

d. Outline and discuss the constraints to the utilization of IAKP by farmers;

e. Outline ways of documenting IAKP for preservation;

f. Describe and utilize IAKP in crop production;

g. Describe and utilize IAKP in livestock production;

h. Describe and utilize IAKP in soil conservation; and

i. Describe and utilize ethno- veterinary medicine in livestock health management.

The mean ratings of Agricultural Education Lecturers and Extension Agents did not differ significantly on the specific objectives of IAKP for integration into NCE Agricultural Education Curriculum. Therefore, the null hypothesis of no significant differences was upheld.

C. Content for achieving the IAKP objectives to be integrated into NCE Agricultural Education curriculum included:

a. General concepts of IAKP

- Characteristics of IAKP
- Importance of IAKP for sustainable Agricultural productions.
- Constraints to the utilization of IAKP by farmers
- Documentation IAKP for preservation

b. Crop production: Yam

- Site selection
- Clearing
- Cultivation
- Selection of planting materials
- Weeding
- Manure application
- Diseases and pest control
- Harvesting
- Processing
- Storage

Maize

- Site selection
- Clearing
- Cultivation
- Selection of planting materials
- Weeding
- Manure application
- Disease and pest control
- Harvesting
- Processing
- Storage

Cassava

- Site selection
- Clearing
- Cultivation
- Selection of planting materials
- Weeding
- Manure application
- Diseases and pests control
- Harvesting
- Processing
- Storage

c. Livestock production : Goat

- Selection of breeds
- Housing
- Feeding
- Routine management practice
- Pests and disease control

Poultry

- Selection of breeds
- Housing
- Feeding
- Routine management practices
- Pest and disease control

d. Soil conservation

- Utilize specific plant species for soil water conservation
- Organic manure preparation to maintain soil fertility
- Application organic manure to maintain soil fertility
- Adoption of IAKP for soil erosion control

e. Ethno – veterinary medicine

- Identification of livestock pests and diseases in a given area
- Identification and documentation of plant species and concoctions for controlling and curing of livestock pests and diseases.
- Utilization of indigenous methods to prepare livestock drugs.

The result of the hypothesis 2 shows that the t-calculated was greater than t-table of 1.96 at .05 levels of significance and 265 degree of freedom. Therefore, the null hypothesis was rejected.

D. Teaching methods relevant for teaching IAKP in NCE Agricultural Education curriculum included:

General concepts of IAKP

- Lecture
- Discussion
- Guided discovery
- Project
- Demonstration
- Problem solving
- Guest speaker/resource person

- Brain storming
- Field trip/excursion
- Experimental method
- Task analysis

Crop Production

- Lecture
- Discussion
- Guided discovery
- Project
- Demonstration
- Problem solving
- Field trip/excursion
- Experimental method
- Task analysis

Livestock Production

- Lecture
- Discussion
- Guided discovery
- Project
- Demonstration
- Problem solving
- Field trip/excursion
- Experimental method

- Task analysis

Soil conservation

- Lecture
- Discussion
- Guided discovery
- Project
- Demonstration
- Problem solving
- Field trip/excursion
- Experimental method
- Task analysis

Ethno –veterinary medicine

- Lecture
- Discussion
- Guided discovery
- Project
- Demonstration
- Problem solving
- Field trip/excursion
- Experimental method
- Task analysis

The result of hypothesis 3 shows that the null hypothesis was rejected for t-calculated was greater than the t-table at 0.05 level of significance and 265 degree of freedom.

E. Evaluation methods relevant for assessing the objectives of IAKP in NCE Agricultural Education curriculum included:

General concepts of IAKP

- Interview
- Questionnaire
- Observational schedule
- Essay type question
- Objective type question
- Anecdotal records
- Sociometric technique
- Performance test

Crop production

- Interview
- Questionnaire
- Observational schedule
- Essay type question
- Objective type question
- Anecdotal records
- Sociometric technique
- Performance test

Livestock production

- Interview

- Questionnaire
- Observational schedule
- Essay type question
- Objective type question
- Anecdotal records
- Sociometric technique
- Performance test

Soil conservation

- Interview
- Questionnaire
- Observational schedule
- Essay type question
- Objective type question
- Anecdotal records
- Sociometric technique
- Performance test

Ethno – veterinary medicine

- Interview
- Questionnaire
- Observational schedule
- Essay type question
- Objective type question
- Anecdotal records

- Sociometric technique
- Performance test

The result of hypothesis 4 shows that the null hypothesis was upheld.

F. NCE Agricultural Education courses in which IAKP could be integrated included:

(a) Concepts of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP into introduction to Agriculture (AGE 111);

(b) IAKP in land preparation, crop propagation and cultural practices into:

Introduction to crop production (AGE 128), Arable crop production (AGE 121)

and tree crop production (AGE 211);

(c) IAKP in crop protection into: principles of crop protection (AGE 223);

(d) IAKP in livestock production into: livestock production I (AGE 225) and livestock production II (AGE 311);

(e) IAKP in poultry production into poultry production (AGE 212);

(f) IAKP in soil conservation into: soil fertility management (AGE 222);

(g) Documentation of IAKP into: Youth organization in Agriculture (AGE 123);

(h) Ethno ï veterinary medicine into: Animal health (AGE 332); and

(i) IAKP for sustainable Agricultural production into: Environmental Education in Agriculture (AGE 321) and practical Agriculture (AGE 127).

Discussion of findings

The discussion of the findings is presented according to issues addressed by research questions:

IAKP Utilized by farmers in Agricultural productions

The finding of the study on IAKP utilized by farmers in Agricultural production showed that farmers utilize IAKP in various agricultural productions which include: crop production, livestock production, soil conservation and ethno-veterinary medicine.

In crop production, farmers utilized various IAKP in different aspects of production and different activities were engaged for different crops. For example in site selection, farmers indicated that they selected sites for yam production based on the land that was fallowed for at least two years. Well drained soil and land that was free from shade were selected for crop production. In land clearing, the farmers stated that it was done by slashing with cutlass and hoes and the wastes were gathered and burnt in heaps to produce ash. Crops were cultivated on mounds, ridges and on flat (non-tilth).

On the selection of planting materials for cultivation, the farmers stated that they selected planting materials based on those that sprouted before planting, those that were free from pests and disease and those that are free from bruises. These findings are in line with the work of Birungi et al (2007) who reported that farmers practiced selection of clean planting materials to control pests and diseases. They also ensure that the cuttings of cassava were not damaged prior to planting and the stems were noted to face upwards to encourage effective sprouting. These are in line with the findings of the study.

Furthermore, the findings of this study revealed that farmers employed various IAKP to control crop pests and diseases. For instance, farmers stated that they dusted planting materials

with ash to control pests, soaking planting materials in (Occimum africana) to reduce pests that were resistant to pests and disease, practiced shifting cultivation and bush fallowing, early planting, use of animal urine and excreta to prevent pests and uprooting/removal of infected plants. These findings are in consonance with the findings of Birungi et al (2007) who noted those farmersô burned grasses or trash in their farms and spread the ash on the farm because the ash were assumed to be a source of nutrients and also burning was believed to kill crop pests.

On harvesting, processing and storage of crops, farmers contended that they utilized various IAKP for different crops. For example, they harvested yam when the yam plant died and they practiced first and second harvest for ware yam and harvesting was done by hand to avoid inflicting bruises on the tubers. Cassava was harvested when matured depending on variety and was harvested with hoe or cutlass whereas maize was harvested by the use of cutlass/sickle. Cassava was processed into garri, dried flour and allowed to rett for foo-foo. Maize was processed by hand removal of husks, sun drying and smoked over the fire place and processed into flour. These findings are in consonance with the findings of Birungi et al (2007) who reported that many root crops awere highly perishable including cassava. They noted that when farmers harvest cassava and not all of them was consumed or sold, the fresh tuber were buried in moist soil and the tuber strayed fresh up to seven days. This implies that farmers utilized IAKP in all aspect of crop production. Also Birungi et al (2007) reported that in the processing of cassava, indigenous practices were utilized. These include peeling, slicing, drying and storing in baskets. For bitter cassava, it was later sliced and left to ferment for three days. It was later dried, chopped and finally ground or pounded into flour. This was in line with the findings of this study.

On IAKP utilized by framers in livestock production, the farmers stated that in the selection of breeds for example in goat production, it was based on big body size, large litter size, broad tails and fine wools whereas in chicken production, selection was based on plumage colour of the birds, weight of the chicken, naked-neck and frizzled feather chickens were selected by healers. On housing, goats were kept under thatched house, under shade or in goat shed, or allowed to roam about inside the compound. Chicken were kept in a basket, some sleep on the fence after roaming about, while some were kept in a corner of a kitchen. On livestock feeding, the farmers contended that they fed goats on residue from processed grains, kitchen wastes, and browse plants and on harvest wastes. Chicken were fed on residues from processed grains, kitchen wastes and they equally pecked on vegetables/leaves.

On routine management practices in livestock production the farmers stated that they utilized various IAKP. For example, they castrated goats with sharp razor blade by cutting the vein that leads to testicles and identification of animals were done by ear notching, tatooing, giving of marks and use of tags. Whereas in chicken production, they identified them by the use of rings/ribbons or piece of clothes which was tied to the wings or detoeing.

Again the farmers indicated that they utilized various ethno-veterinary medicines in managing and treating various livestock pests and diseases. For example, scabies in livestock were treated with the use of palm kernel oil and mixture of kerosene with ash, mites attack/coccidiosis in poultry were treated with palm oil, grounded alligator pepper and a mixture of ash and grounded pepper; cold and cough were treated with thyme (*Thymus valgaris*), hot leaves (*Occiumum africana*) and paw-paw seeds. Bleeding in animals was stopped by the use of Siam weed (*Chromolaene odroatum*) bitter leaf (*Vernonia amygdalina*), pulp of oil palm (*Eleasis guinensis*) and pulp of coconut (*Cocus nucifera*). Poison was treated with red palm oil.

Disengagement of placenta and other reproductive problem were treated by the use of cowpea leaves and salt, potato leaves, S*spondias mombin*) (ijikere) and (*Newbouldia laevis*) (ogirishi). Ecto- parasites like tick were treated with palm oil, by hand picking and pricking with sharp objects.

The findings on IAKP utilized by farmers and ethno-veterinary medicine stated above agreed with the findings of Birungi et al (2007) who conducted a study on IK used in farming in Uganda and they reported the following: when a brooding hen abandons the egg completely because of pest infestation, farmers introduced dry banana leaves in a mortar and position it near a fire place to aid eggs brooding process, Farmers supplemented feeds for hen with millet and maize to encourage hens to lay more eggs, Chicken were fed with the mixture of millet and paraffin to prevent coccidiosis. Chickens infected with coccidiosis were injected with or given a mixture of ash, ground pepper and water to drink, Farmers gave potato leaves to chicken to peck as de-worm agent. Paw-paw seeds were also given to chicken as a de-worming agent. Other IK used in farming as reported by Birungi et al (2007) include: castrating their animals using a rudimentary method which is by cutting veins leading to the testicles using a sharp razor blade and by a tedious approach of pricking fleas with a needle leaving them to die on the animal to control pests.

The findings on ethno-veterinary medicine were in line with the report of Ibrahim (1996) and Eni (2005) respectively. Ibrahim noted that Hausa and Fulani stock raisers recognized various animals and other organic and inorganic materials that were toxic and as such regulated their use in animal feeding. He equally stated that Fulaniôs for instance had detailed knowledge of the pharmaceutics properties of most plants in their habitats and they use them in remedies against array of animal diseases such as constipation, stomach upsets, worm infestations and

congestion. On his part, Eni (2005) reported that indigenous farmers employed curative materials of plants origins in the treatment of worms. They used butea leaves, wild yam and hot leaves to de-worm animals. He equally reported that pulp of *Cocus nucifera*, *Vernonia amygdalina* and *Eleasis gunensis* were used to stop of bleeding in animals. The farmers removed after birth of animals with fresh leaves of *Spondia mumbin* (Eni, 2005).

On IAKP utilized by farmers in soil conservation, the farmers contended that to ensure soil water conservation, they mulched with dry grasses, palm fronds and leaves, spread compost manure and animal dung, practiced nursery under shade or nursery shed and adopted multiple cropping and cover cropping. Soil fertility was conserved by applying compost manure, animal dung, practicing crop rotation, shifting cultivation, cover cropping, planting of legumes, multiple cropping and inter cropping, whereas soil erosion was controlled by practicing non- tilth/zero tillage, construction of bunds to check run off, making of big mounds to reduce run off and flooding, planting of trees like bamboo in erosion prone areas and planting of perennial vegetation. The findings of this study agreed with the submission of Birungi et al (2007) who reported out that indigenous farmers expressed reasonable knowledge on soil fertility indicators. They could determine when the soil was exhausted and used various means at every stage of plant growth to cope with the problem of soil fertility loss.

Mckell (2007) reported that indigenous farmers were central players in the promotion of soil conservation in agriculture. He revealed in his research that the introduction of non-tilth resulted to improving soil physical characteristics such as aggregation, bulk density as well improved soil pH, nitrogen and phosphorus level. Their findings were in line with the finding of this study. Again, the findings of this study agreed with the report of Dialla (1994) who identified eight conservation practice used by local farmers and promoted by extension services.

These include: the application of manure, building terraces in the field to slow water runoff, stone lining, mulching, fallow, planting hedges, strip vegetation and reforestation. More so, Pitakia and Aaron (2003) reported that indigenous farmers frequently used mixed cropping to create favourable condition for soil water, nutrients and provide excellent environmental sustainability. They summarized that majority of the indigenous farmers utilized mixed cropping, fallowing, intercropping and mulching to maintain soil fertility.

The findings of this study on IAKP utilized by farmers in agricultural production showed that indigenous farmers utilized various IAKP which cut across the crops they grew and animals they reared and this supported the research conducted by Sundaramari and Ranganathan (2003) who pointed out that IAKP in agriculture were organic in nature, they did not cause any damage to air, water and soil, safe to human beings and were free from causing environmental pollution.

Objectives of IAKP for integration into NCE Agricultural Education Curriculum

The findings of the study on objectives of IAKP for integration into NCE Agricultural Education revealed that the objectives agreed by the respondents to be integrated include: define the concept of IK and IAKP, discuss the characteristics of IAKP, appreciate the values of IAKP for sustainable agricultural productions, outline and discuss the constraints to the utilization of IAKP by farmers, outline ways of documenting IAKP for preservation, describe and utilize IAKP in crop production, livestock production, soil conservation and utilize ethno-veterinary medicine in livestock health management. The objectives identified above would help to transfer Indigenous Agricultural Knowledge and Practices to younger generations because IK was a systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture (Rajasekaran, 1993). The objectives identified above are in agreement with the

submission of Rajasekaran (1993) who maintained that indigenous knowledge was adaptive skills of local people usually derived from many years of experience that had often been communicated through oral traditions and learned through family members over generations. The above statement illustrated that IK systems were invaluable, diversified and comprehensive. More so, the specific objective identified by this study for integration into NCE Agricultural Education Curriculum was in line with Offormaôs (2002) report who noted that specific objective were statements of behavioural expectations of the learners at the end of each learning sequence. In agricultural teaching, action verbs are used to express specific objectives. The findings of this study took care of these.

Content of IAKP to be integrated into NCE Agricultural Education Curriculum

Finding of the study on content of IAKP to be integrated into NCE Agricultural Education Curriculum showed that concept of IK and IAKP, characteristics of IAKP, importance of IAKP for sustainable agricultural productions, constraint to the utilization of IAKP by farmers, documentation of IAKP for preservation, utilization of specific plant species for soil water conservation, organic manure, adoption of IAKP for soil erosion control, identification of livestock pests and disease in a given area, identification and documentation of plant species and concoctions for controlling and curing livestock pests and diseases and the utilization of indigenous methods to prepare livestock drugs were the relevant contents of IAKP to be integrated into NCE Agricultural Education Curriculum. Furthermore, the findings of the study revealed that IAKP utilization in different crop production especially in site selection, clearing, cultivation, selection of planting materials, weeding, manure application, diseases and pests control, harvesting, processing and storage. Also in animal production; selection of breeds,

housing, feeding, routine management practices, pests and diseases control were the relevant IAKP content to be integrated into NCE Agricultural Education Curriculum.

The finding of the study on this aspect were in line with the objectives and scope of Indigenous Agricultural knowledge as Pamela (1994) reported out that the IK systems had a great deal to offer in terms of genetic resources, food, medicines, clothing, shelter, fuel, tools, techniques were crop and animal protection. She maintained that IAKP are varied, adaptable, nature friendly and produced yield that were not necessarily lower than those of modern agriculture. She concluded that in the absence of appropriate modern alternatives, IK had become a starting point for academic and other institutions in their search for solutions.

Furthermore, writing on the scope of IAKP which the content revealed by the findings of this study, Rajasekaran (1993) indicated that in all agrarian societies, indigenous food production systems form the basis of food and nutritional security. He insisted that IK could be used to fulfill socio economic needs and conserve biodiversity at one time and at the same time. He went further to indicate that identifying, documenting and incorporating IAKP in Agricultural extension organizations and school curriculum was essential in order to achieve sustainable agricultural development.

Teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum

The findings of the study showed that Lecturers and Extensions Agents agreed that the following teaching methods were relevant in teaching IAKP in NCE Agricultural education curriculum: lecture, discussion, guided discovery, project, demonstration, problem solving, library search, guest speaker/resource person, brain storming, field trip/excursion, experimental method and task analysis. These teaching methods are relevant in teaching general concept of IAKP, crop production, livestock production, soil conservation and ethno-veterinary medicine.

These findings are in line with submission of Osinem (2008) who stated that effective teaching requires skillful teachers to use many different methods of teaching at their disposal but carefully designed teaching method can work wonders in making teaching effective; The findings also agreed with Olaitan (1984) Egbule (2002) and Osinem (2008) who stated that lecture method, discussion, problem solving, demonstration, field trip, project, workshop and task instructional sheet (TIS) can be utilized in effective teaching of agriculture in schools since they are the orderly procedures used by the teacher to direct learners in developing skills, attitudes, habits and knowledge.

Evaluation methods that should be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum

The finding of the study on this segment showed that interview, questionnaire, observational schedule, essay type question, objective question, anecdotal records, sociometric technique and performance test were the evaluation methods to be adopted for assessing the objective of IAKP in NCE Agricultural Education Curriculum. The finding were in agreement with Offorma (2002) who explained evaluation to mean the process of findings out the strengths and weakness of the whole curriculum endeavour. Also, Olaitan (2003) stated that evaluation was the process of obtaining information on what one was doing towards achieving objectives, how far one could go on achieving the objectives and constraints hindering the achievement of the objectives, and also what one could do to overcome the constraints of achieving the objectives. The findings agreed with Osinem (2008), Egbule (2002) and Olaitan (1984) respectively who enumerated various measures that learners ability and educational outcomes could be appraised which include: oral tests, achievement tests, performance tests, observational schedule, interview schedule, questionnaire and sociometric technique.

Existing courses in which IAKP could be integrated in NCE Agricultural Education Curriculum

From the analysis of data on the above, the result showed that all the items were agreed by the respondents on the courses in which IAKP could be integrated into NCE Agricultural Education Curriculum. This implies that: concept of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP could be integrated into introduction to agriculture (AGE 111), IAKP in land preparation, crop propagation and cultivation practices could be integrated into introduction to crop production (AGE 128), arable crop production (AGE 121) and tree crop production (AGE 211). IAKP in crop protection into: principles of crop protection (AGE 223); IAKP in livestock production into livestock production 1 (AGE 225) and livestock production II (AGE 311).

Furthermore, the study revealed that IAKP in poultry could be integrated into poultry production (AGE 212), IAKP in soil conservation into soil fertility management (AGE 222), documentation of IAKP into youth organization in agriculture (AGE 123), ethno-veterinary medicine could be integrated into animal health (AGE 322) IAKP for sustainable agricultural productions into environmental education in agricultural (AGE 321) and practical agriculture (AGE 127).

The integration of IAKP into NCE Agricultural Education Curriculum would help to achieve the aim of offering Agricultural Education programmes in their curriculum. According to Egbule (2002), the programmes were drawn from the broad objectives of the larger society. Also the integration would help to develop in the student teachers skills for effective transmission of IAKP information to the students in the context of their environment. Since IAKP as reported by World Bank (1998) provides the basis for problem solving strategies for local communities especially the poor, this represents an important component of global

knowledge on development issues and underutilized resources in the development process, learning from IK by integrating it into NCE Agricultural Education Curriculum would help to bridge the gap in Agricultural knowledge transfer since NCE teachers of agriculture were expected to teach in primary and secondary schools.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

Restatement of the Problem

Farmers for centuries have planned agricultural production and conserved natural resources with the instruments of IK. The development of IK systems has been a matter of survival of people who generated the systems. Such systems are cumulative, representing generations of experience, careful observations and trial and error experiments.

In Nigeria, many of the IAKP and allied fields are being replaced by modern technologies and are regarded obsolete especially among the younger generations. Also IAKP systems is deteriorating due to the deaths of elderly people since there is no formal documentation of such knowledge and some individuals deliberately refuse to share the knowledge of IAKP they possess with others due to selfishness and desire for monopoly and power. Furthermore, IAKP has not been systematically documented and thus not well appreciated. The failure to document and integrate IAKP into the school curriculum may have contributed to its neglect. Instead of documentation, more discussions are focused on contemporary scientific knowledge systems some of which did not sufficiently address the agricultural and environmental concerns of the people.

Now that the IAKP are endangered because they have not been documented, there is possibility for them to become extinct particularly during this era of globalization, liberalization and commercialization. There is therefore the need for IAKP documentation especially in agricultural production. Hence the study was aimed at identifying and documenting IAKP in crop and livestock production, soil conservation and ethno-veterinary medicine for integration into NCE Agricultural Education curriculum.

The purpose of this study was to document and integrate IAKP into NCE Agricultural Education Curriculum. Specifically, the study aimed at:

i. identifying IAKP utilized by farmers;

ii. determining the objectives of IAKP to be integrated into NCE Agricultural Education Curriculum;

iii. determining the content that should be utilized to achieve the objectives of IAKP in NCE Agricultural Education Curriculum;

iv. determining the methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum;

v. Determining the evaluation methods to be adopted for assessing the attainment of the objectives of IAKP in NCE Agricultural Education Curriculum; and

vi. Determining the existing courses in which IKAP could be integrated into NCE Agricultural Education Curriculum.

Description of the Procedure Used

The study answered six research questions and tested four hypotheses. Literature related to the study was reviewed in line with the specific objectives of the study. A descriptive survey design and Rapid Rural Appraisal were adopted in conducting the research. The target population comprised all indigenous farmers above 60 years of age who utilized IAKP in their agricultural productions, Extension Agents and Lecturers in Agricultural Education programmes in Colleges of Education in South Eastern States of Nigeria. The states include: Abia, Anambra, Ebonyi, Enugu and Imo states. A sample of 327 was used. This comprised 60 indigenous farmers, 182 Extension Agents and 85 Lecturers in Agricultural Education programme.

Data collection instruments were interview schedule and questionnaire. The interview schedule comprised five sections while the questionnaire consists of five sections of 163 items. The interview schedule was used to elicit information from aged farmers while Lecturers and Extensions Agents responded to the questionnaire. The instrument was face validated by seven experts: three from Department of Vocational Teacher Education (Agricultural Education), two from Department of Agricultural Extension and 2 from Curriculum and Instruction Unit of Arts Education all from University of Nigeria, Nsukka. The reliability coefficient of the instrument was established using Cronbach alpha which yielded the overall reliability coefficient of 0.90. The instruments were administered to the respondents by personal contacts with the help of five Research Assistants. The data collected for research question one was analyzed qualitatively while data from research question 2 -7 were analyzed using mean, standard deviation and t-test statistic to test the hypotheses.

Principal Findings of the Study

Based on the data analyzed, the following principal findings were made:

a. Indigenous farmers utilized IAKP in their agricultural productions. This cut across the crop they produced and animals they reared. In crop production, IAKP were utilized in site selection, clearing, cultivation, selection of planting materials, weeding, manure application, pests and diseases control, harvesting, processing and storage;

b. In animal production, IAKP were utilized in selection of breeds, housing, feeding, management practices, pests and disease control, processing and storage;

c. Farmers utilized IAKP in soil moisture conservation, soil fertility conservation and soil erosion control;

d. Farmersô mange animal pests and diseases in animal production using ethno-veterinary medicine;

e. Objectives of IAKP for integration into NCE Agricultural Education Curriculum included: Define the concept of IK and IAKP , Discuss the characteristics of IAKP, Appreciate the values of IAKP for sustainable agriculture, Outline and discuss the constraints to the utilizations of IAKP by farmers, Outline ways of documenting IAKP for preservation, Describe and utilize IAKP in crop production, Describe and utilize IAKP in livestock production, Describe and utilize IAKP in soil conservation, Utilize ethno-veterinary medicine in livestock health management;

3. Content of IAKP to be integrated into NCE Agricultural Education included:

Concept of IK and IAKP, Characteristics of IAKP, Importance of IAKP for sustainable agricultural productions, Constraints to the utilization of IAKP, Documentation of IAKP and utilization of specific plant species for soil water conservation, Organic manure preparations, Application of organic manure, Adoption of IAKP for soil erosion control, Identification of livestock pests and diseases in a given area, Identification of documentation of plant species and concoctions for controlling and curing livestock pests and diseases and Utilization of indigenous methods to prepare livestock medicine;

4. Teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum included: Lecture, Discussion, Guided discovery, Project, Demonstration, Problem solving, Library search, Guest speaker/resource person, Brain storming, Field trip/excursion, Experimental method and Task analysis;

5. Evaluation methods to be adopted for assessing the objectives if IAKP in NCE Agricultural Education Curriculum included: Interview, Questionnaire, Observational schedule, Essay type

question, Objective type question, Anecdotal records, Sociometric technique and Performance test; and

6. Existing courses in which IAKP could be integrated in NCE Agricultural Education progrmmme included:

- Concepts of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP into introduction to Agriculture (AGE 111);
- IAKP in land preparation, crop propagation and cultural practices into introduction to crop production (AGE 128). Arable crop production (AGE 121) and tree crop production (AGE 211);
- IAKP in crop protection into: principles of crop protection (AGE 223);
- IAKP in livestock production into: livestock production I (AGE 225) and livestock production II (AGE 311);
- IAKP in poultry production into poultry production (AGE 212);
- IAKP in soil conservation into: soil fertility management (AGE 222);
- Documentation of IAKP into: Youth organization in Agriculture (AGE 123);
- Ethno ï veterinary medicine into: Animal health (AGE 332);and
- IAKP for sustainable Agricultural production into: Environmental Education in Agriculture (AGE 321) and practical Agriculture (AGE 127).

Conclusions

Based on the findings of this study, the following conclusions were drawn;

1. Farmers utilized various IAKP in agricultural productions which cut across the crops they produced and animals they reared. This is because IAKP are organic in nature. They do

not cause any damage to air, water and soil, safe to human beings and are free from causing environmental pollution.

2. Indigenous agricultural knowledge can work harmoniously with the modern technologies in agriculture and they could be instrumental in propagating the hazardless, eco-friendly, evergreen and sustainable agriculture for the well being of our offspring.
3. Objectives of IAKP to be integrated into NCE Agricultural Education Curriculum are stated in terms of studentsô achievement at different levels such as understanding (knowledge), skills (practical performance) and affects (appreciation). These objectives are comprehensive and cover some aspects of agricultural productions as stated in the scope of this study.
4. The content of IAKP which covers knowledge, skills, attitudes and values to be learned have been selected to achieve the objectives of IAKP. The contents of IAKP are those practices, related facts, designs and solutions drawn from what the mind of men have comprehended from accumulated farming experiences.
5. Different methods of teaching are relevant for teaching IAKP in NCE Agricultural Education Curriculum. The methods are selected bearing in mind the range ability and experience of the learners. Hence variety of teaching methods can be adopted to make the teaching of IAKP effective as noted by the study.
6. Different evaluation methods are relevant in assessing the objectives of IAKP in Agricultural Education Curriculum. These instruments of evaluation should be utilized continually to determine whether the content presented to the learner contributes to the behavioural changes desired in students.

7. Different aspect of IAKP could be integrated into different existing courses in NCE Agricultural Education Curriculum. This will help to bridge the gap in agricultural knowledge transfer since agricultural science teachers are trained in colleges of education who offer NCE agricultural education programme.

Implication of the Study

The findings of this study have far reaching implications to the farmer, Extension Agents, Agricultural Education Lecturers, Governments, non-governmental organizations (NGOs) and students. Indigenous Agricultural Knowledge and Practices have been developed, propagated and passed to several generations by farmers. The activities are eco-friendly as they involve the manipulation of natural resources for survival and sustenance. This implies that the farmers would help in the identification and documentation of IAKP for preservation. This would be a pride for them since IAKP are borne out of their creativity.

The study has an implication to policy makers. The IAKP documented by this study should be considered by policy makers as a knowledge- based assets to be blended with modern technologies that require high external input, more risks and even hazardous to the environment. Hence the policy makers should include IAKP in their policies for promoting sustainable agriculture.

Again, this study has implications to extension agents. The IAKP documented in this study should be recommended by Extension Agents to other farmers for their adoption. Also the Extension Agents should try to include the identified and documented IAKP in their technology transmission process in order to replace those modern technologies that are hazardous to environment and the eco-systems. Furthermore, most of the IAKP do not involve the injurious chemicals and hence their procedures would be considered as healthy and eco- friendly. The

Extension Agents should suitably educate the consumers to patronize the farm output produced with the use of IAKP.

Farmers possess and utilize various IAKP in their agricultural productions. Most of these IAKP are not documented hence they are not transferred to the younger generations. The study identified, documented and packaged IAKP for integration into NCE Agricultural Education Curriculum. Hence the curriculum planners in other levels of education should integrate IAKP in their curriculum. Also, the Lecturers should teach IAKP in various courses identified in the study. This would help to bridge the gap in agricultural knowledge transfer.

Finally, NGOôs are required to establish and sponsor projects that could help to harness IAKP. This would encourage a greater cooperation among other NGOôs and between the indigenous farmers. The Results of this cooperation would generate a greater enthusiasm among members of the rural communities. The implication is that where such IAKP is confirmed to be replicated and functional, it would help to spotlight indigenous knowledge as a dependable form of knowledge and good substitute, alternative or complement to modern agricultural practices.

Recommendations

Based on the findings, the following recommendations were made:

1. There is need for proper identification of IAKP in other aspects of agricultural productions as it is done in modern agricultural practices. This would ensure their retention for future generation.
2. The IAKP identified should be popularized. The ethno-veterinary practices utilize by farmers should be classified, multiplied and conserved for further investigations.

3. Seminar, workshop and conferences should be organized to educate the stakeholders on the need to utilize IAKP in their agricultural production which are environmental friendly.
4. Policy makers should formulate policies that will promote the adoption and utilization of IAKP
5. The National Commission for Colleges of Education (NCCE) should ensure the integration of IAKP in the curriculum of Agricultural Teacher Education programme in Colleges of Education since the student teachers when graduated will teach in Primary and Secondary Schools.
6. NGOôs should sponsor research on IAKP since most of them are interested in environmental conservation which IAKP offers.

Limitations of the Study

1. Since the area of the study was South Eastern Nigeria, the findings of the study could therefore only be applicable to those areas where similar conditions exist in the country.
2. Although the study had taken all the precautions, the chances of bias could not be completely eliminated especially in the methodology adopted for the study.
3. The study did not test the identified IAKP for their effectiveness.

Suggestions for Further Research

Further researches should address the following areas;

1. Similar studies should be done in other parts of Nigeria since the country is made up of different climatic zones and different crops and animals exist.
2. Intensive studies should be conducted to identify and document the IAKP available in specific cultivation practices in individual crops not considered in this study.

3. Field trials should be conducted to test the effectiveness of IAKP documented so as to develop package for use by farmers and show the farm results.
4. The study could also be conducted adopting other methodologies available like cross sectional survey.
5. Research may be conducted on integration of IAKP in Secondary Schools Agricultural Science Curriculum.

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APPENDIX 1
RESEARCH INSTRUMENTS

UNIVERSITY OF NIGERIA, NSUKKA
DEPARTMENT OF VOCATIONAL TEACHER EDUCATION

INTERVIEW SCHEDULE FOR KEY INFORMANT INTERVIEW (KII) AND FOCUS GROUP DISCUSSION (FGD) ON INDIGENOUS AGRICULTURAL KNOWLEDGE AND PRACTICES (IAKP) UTILIZED BY FARMERS.

SECTION A. PERSONAL DATA

NAME: ----------

TOWN/VILLAGE: ----------

AGE: ----------

FOR HOW LONG HAVE YOU BEEN A FARMER ----------

TYPE OF AGRICULTURE: Pastoral Farming ( ) Crop farming ( )

Mixed farming ( )

What type of crop(s) do you cultivate? ----------

What type of livestock do you rear? ----------

SECTION B:

What are the Indigenous Agricultural Knowledge and Practices (IAKP) used by farmers in the following activities in the production of crops (yam, maize and cassava)?

Site selection ----------

Clearing ----------

Cultivation ----------

Selection of planting materials ----------

Weeding ----------

Manure application ----------

Pest and disease control ----------

Harvesting----------

Processing----------

Storage----------

SECTION C:

What are the IAKP used by farmers in the following areas in livestock production (goat and chicken)?

Selection of breeds ----------

Housing ----------

Feeding ----------

Management practices like castration, tattooing etc ----------

Pest and disease control ----------

Processing and storage ----------

SECTION D:

What are the IAKP used by farmers in the following areas in soil conservation?

Soil moisture conservation ----------

Soil fertility conservation ----------

Soil erosion control ----------

SECTION E:

What are the livestock diseases and pests in your area? é é é é é é é é

How do you manage/ treat the diseases and pests with ethno-veterinary medicine? ----------

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UNIVERSITY OF NIGERIA, NSUKKA
DEPARTMENT OF VOCATIONAL TEACHER EDUCATION

QUESTIONNAIRE ON INTEGRATION OF INDIGENOUS AGRICULTURAL KNOWLEDGE AND PRACTICES (IAKP) INTO NIGERIA CERTIFICATE IN EDUCATION (NCE) AGRICULTURAL EDUCATION CURRICULUM.

Part I: Personal Data

i. Name of school/organization _____

ii. Designation: Lecturer [ ], Extension agent [ ]

Part II:

Instruction

Please check (√) in the Colum provided the extent of either your agreement on the items states below or their relevance.

Key:

Highly Relevant ï (HR) Strongly Agree ï (SA)

Moderately Relevant ï (MR) Agree ï (A)

Slightly Relevant ï (SR) Disagree ï (D)

Not Relevant ï (NR) Strongly Disagree (SD)

Section A:

Specific objectives of Indigenous Agricultural Knowledge and Practices (IAKP) for integration into NCE Agricultural Education Curriculum.

S/N	Item Statements	HR	MR	SR	NR
1	Define the concept of Indigenous Knowledge (IK) and Indigenous Agricultural Knowledge and Practices (IAKP)				
2	Discuss the characteristics of IAKP				
3	Appreciate the values of IAKP for sustainable agricultural productions				
4	Outline and discuss the constraints to the utilization of IAKP by farmers				
5	Outline ways of documenting IAKP for preservation				
6	Describe and utilize IAKP in crop production				
7	Describe and utilize IAKP in livestock production				
8	Describe and utilize IAKP in soil conservation				
9	Describe and utilize ethno-veterinary medicine in livestock health management				

Section B:

Content of IAKP to be integrated into NCE Agricultural Education Curriculum

S/N	Item Statements	HR	MR	SR	NR
	General Concepts				
10	Concept of IK and IAKP				
11	Characteristics of IAKP				
12	Importance of IAKP for sustainable agricultural productions				
13	Constraints to the utilization of IAKP by farmers				
14	Documentation IAKP for preservation				
	Crop Production: Yam Utilize IAKP in;				
15	Site selection				
16	Clearing				
17	Cultivation				
18	Selection of planting materials				
19	Weeding				
20	Manure application				
21	Disease and pest control				
22	Harvesting				
23	Processing				
24	Storage				
Maize Production Utilize IAKP in;					
25	Site selection				
26	Clearing				
27	Cultivation				
28	Selecting of planting materials				
29	Weeding				
30	Manure application				
31	Disease and pest control				
32	Harvesting				
33	Processing				
34	Storage				
Cassava Production Utilize IAKP in;					

35	Site selection				
36	Clearing				
37	Cultivation				
38	Selecting of planting materials				
39	Weeding				
40	Manure application				
41	Disease and pest control				
42	Harvesting				
43	Processing				
44	Storage				
	Livestock Production: Goat Utilize IAKP in;				
45	Selection of breeds				
46	Housing				
47	Feeding				
48	Routine management practices				
49	Pest and disease control				
	Poultry Production Utilize IAKP in				
50	Selection of breeds				
51	Housing				
52	Feeding				
53	Routine management practices				
54	Pest and disease control				
	Soil conservation				
55	Utilize specific plant species for soil water conservation				
56	Organic manure preparation to maintain soil fertility				
57	Application of organic manure to maintain soil fertility				
58	Adoption IAKP for soil erosion control				
	Ethno-Veterinary Medicine				
59	Identification of livestock pests and disease in a given area.				
60	Identification and documentation of plant species and concoctions for controlling and curing livestock pests and diseases				
61	Utilization indigenous methods to prepare livestock drugs				

Section C:

Teaching methods to be adopted in teaching IAKP in NCE Agricultural Education Curriculum

S/N	Items Statements	HR	MR	SR	NR
	General concept of IAKP				
62	Lecture				
63	Discussion				
64	Guided discovery				
65	Project				
66	Demonstration				
67	Problem solving				
68	Library search				
69	Guest speaker/resource person				
70	Brain storming				
71	Field trip/excursion				
72	Experimental method				
73	Task analysis				
Crop Production					
74	Lecture				
75	Discussion				
76	Guided discovery				
77	Project				
78	Demonstration				
79	Problem solving				
80	Field trip				
81	Experimental method				
82	Task analysis				
Livestock Production					
83	Lecture				
84	Discussion				
85	Guided discovery				
86	Project				
87	Demonstration				
88	Problem solving				
89	Field trip				
90	Experimental method				

91	Task analysis				
Soil Conservation					
92	Lecture				
93	Discussion				
94	Guided discovery				
95	Project				
96	Demonstration				
97	Problem solving				
98	Field trip				
99	Experimental method				
100	Task analysis				
Ethno-Veterinary Medicine					
101	Lecture				
102	Discussion				
103	Guided discovery				
104	Project				
105	Demonstration				
106	Problem solving				
107	Field trip				
108	Experimental method				
109	Task analysis				

Section D:

Evaluation methods to be adopted for assessing the objectives of IAKP in NCE Agricultural Education Curriculum

S/N	Evaluation Methods;	HR	MR	SR	NR
General Concept					
110	Interview				
111	Questionnaire				
112	Observational schedule				
113	Essay type question				
114	Objective type question				
115	Anecdotal records				
116	Sociometric technique				
117	Performance test				
Crop Production					
118	Interview				
119	Questionnaire				
120	Observational schedule				
121	Essay type question				
122	Objective type question				
123	Anecdotal records				
124	Sociometric technique				
125	Performance test				
Livestock Production					
126	Interview				
127	Questionnaire				
128	Observational schedule				
129	Essay type question				
130	Objective type question				
131	Anecdotal records				
132	Sociometric technique				
133	Performance test				
Soil Conservation					
134	Interview				
135	Questionnaire				
136	Observational schedule				
137	Essay type question				
138	Objective type question				

139	Anecdotal records				
140	Sociometric technique				
141	Performance test				
Ethno-Veterinary Medicine					
142	Interview				
143	Questionnaire				
144	Observational schedule				
145	Essay type question				
146	Objective type question				
147	Anecdotal records				
148	Sociometric technique				
149	Performance test				

Section E: Existing courses in which IAKP could be integrated into NCE Agricultural Education Curriculum

S/N		SA	A	D	SD
150	Integrating the concept of IK, IAKP, importance and characteristics of IAKP and constraints to the utilization of IAKP into: **introduction to agriculture (AGE 111)**				
151	Integrating IAKP in land preparation, crop propagation and cultural practices into: **- introduction to crop production (AGE 128)**				
152	**-arable crop production (AGE 121)**				
153	**-tree crop production (AGE 211)**				
154	Integrating IAKP in crop protection into: **- principles of crop protection (AGE 223)**				
155	Integrating IAKP in livestock production into: **- livestock production 1 (AGE 225)**				
156	**-livestock production II (AGE 311)**				
157	Integrating IAKP in poultry into: **- poultry production (AGE 212)**				
158	Integrating IAKP in soil conservation into: **- soil fertility management (AGE 222)**				
160	Integrating documentation of IAKP into: **- youth organization in Agriculture (AGE 123)**				
161	Integrating ethno veterinary medicine into: **- animal health (AGE 322)**				
162	Integrating IAK P for sustainable agricultural productions into: **- environmental education in agriculture (AGE 321)** and				
163	**-practical agriculture (AGE 127)**				

APPENDIX 2
NCE AGRICULTURAL EDUCATION COURSES.

VTE 110: INTRODUCTION TO VOCATIONAL AND TECHNICAL EDUCATION 1C

Definition, Scope, Philosophy and Objectives of Vocational and Technical Education. Development of vocational and technical education in Nigeria.

The role of vocational and technical education in national development.

Characteristics of Vocational and Technical Education.

Funding of vocational and technical education in Nigeria. Place of vocational and technical education in the UBE Scheme.

Vocational Associations, Organizations and organs.

Problems and Prospects of Vocational and Technical Education in Nigeria.

AGE 111 INTRODUCTION TO AGRICULTURE 1C

Meaning and scope of Agriculture. importance of Agriculture in the Nigerian economy. General concepts and terms used in soils; crop production, extension, economics, methodology etc. Brief history of Agricultural Development in Nigeria and the World. Types of farming, World-farming systems. Systems of land ownership. Agriculture and the natural environment with emphasis on such phenomena as desert encroachment, soil erosion, etc. Problems of Agricultural development in Nigeria. Role of Government in agricultural development in Nigeria. Agriculture as industry utilizing science and technology. Some basic farm tools and their uses. Principles and practice of nomadic agriculture-characteristics of migrant fishermen and nomads.

AGE 112 AGRICULTURAL BIOLOGY 2C

Definition of Agricultural Biology.

Basic Agricultural Biology Concepts.

Importance of Agricultural Biology.

Basic relationships between plants and Animals

Cell Structure and functions.

Cell division (mitosis & meiosis) as basis for continuity of life

Classification of plants and animals.

Botanical names of commonly found species of plants and animals in the locality.

Identification of plant and animal species of Agricultural importance.

Anatomy and physiology of crops and animals.

Osmosis, diffusion and plasmolysis.

Transportation and translocation in plants.

Photosynthesis: definition, factors influencing, agricultural importance and strategies for enhancing photosynthesis.

Fruits and seed dispersal.

Germinating process and conditions.

Photoperiodism and its impact on growth and development of plants.

Environment and food chains: population and ecosystem in relation to growth and development of crops.

Aquarium - definition, principles and importance.

Preparation of insect box and herbarium based on common insect species and in the local

AGE 113 AGRICULTURAL MATHEMATICS 1C

Units of measurements, calculation of areas and volumes. Arithmetic and geometric progressions. Simple simultaneous and quadratic equations. Elementary trigonometry and co-ordinate geometry. Graphs and their mathematical applications in agriculture e.g. plant population and yield studies.

AGE 114 AGRICULTURAL PHYSICS 1C

Properties of matter. A broad and elementary treatment of motion and force. Friction, machines, levers, adhesion, cohesion, viscosity, surface tension, elasticity. Energy and conservation laws. General principles of heat, light, electricity and magnetism.

AGE 115 INTRODUCTION TO AGRO-CLIMATOLOGY 2C

Meaning and scope of agro-climatology . General principles of agro-climatology and equipment used in study. Climatic factors (temperature, precipitation, relative humidity, wind, solar radiations, cloud cover, etc.) and how they affect agriculture production. Ecological zones of Nigeria and their effect on ecological distribution of crops, livestock and soil formation. Principles underlining weather forecasting.

AGE 116 AGRICULTURAL CHEMISTRY 2C

The nature of matter - elements, mixtures and compounds

Basic treatment of atomic, molecular and ionic theories

Conditions affecting chemical change such as

equilibrium, catalysis, enzyme action etc.

General properties of elements in relation to the periodic table

Types of chemical bonds, octet rules. Characteristics and significant reactions of metal and non-metals. Acid bases and salts Introduction to the rules of IUPAC nomenclature of organic compounds. Treatment of hydrocarbons, lipids proteins, enzymes, co-enzymes and hormones.

AGE 117 PRACTICAL AGRICULTURE (I) 1C

Maintenance of individual/group farm plots.

Identification of simple farm tools, their uses, care and maintenance. Keeping of simple records and diaries. Land preparation in nursery practices. Care of plants before and after transplanting e.g. watering, weeding, mulching, etc.

AGE 118 INTRODUCTION TO CROP PRODUCTION 2C

Meaning and aims of crop production. Measures of quantity and quality of crop produce and products. Genetic and environmental factors affecting crop production (including seed quality, seed rate, plant population, soil quality, climatic and agronomic factors, weeds, pests and diseases). Cropping seasons as they affect production. Agronomic classification of crops and uses. Methods of crop propagation. Meaning and types of pasture. Importance and methods of pasture management.

YEAR ONE – SECOND SEMESTER

AGE 121 ARABLE CROP PRODUCTION 2C

Meaning of arable crops. Botany, culture, harvesting, processing, preservation, storage, marketing and utilization of major annual crops belonging to the following :-

Cereals (maize, rice, wheat, sorghum, millet)

Tubers (yams, cassava, coco-yam and potatoes)

Fibers (Kenaf, jute, etc.)

Legumes (cowpea, groundnut, soybeans, pigeon pea and lima bean, etc.)

AGE 122 INTRODUCTION TO ANIMAL SCIENCE 1C

Meaning and scope of animal science. Classification of livestock within the animal kingdom. Types and classification of domestic animals. Anatomy and physiology of selected farm animals. Livestock policy in the National Development Plans. Contributions of farm animals to peasant farming. Prospects and problems of livestock production in Nigeria.

AGE 123 YOUTH ORGANISATION IN AGRICULTURE 2C

Definition and objectives of youth organization in agriculture. Guidelines for establishing, managing and sustaining agricultural youth organization and clubs in schools. Structure of youth organization in schools. Activities of in-school youth organization in agriculture. Types of leadership in agricultural youth organization.Conduct of meetings in an in-school youth organization. Simulation of youth activities in schools/practical experiences should be offered in public speaking, group

dynamics, organizational skills, time management, social/community involvement, leadership styles and decision making).

Parliamentary procedure and committee management. Ways of motivating youth interest in agriculture. Activities should include professional meetings, service to social/civic groups, school projects requiring responsible planning, organization and management.

AGE 124 PRINCIPLES OF ECONOMICS 1C

Meaning and concepts of economics. Principles of supply and demand of goods and services. Elasticity of demand and supply. Production theory and curves. Concepts of macro-economics (GDP and GNP etc.) Distribution of income, wages, profits, rents and interest.

AGE 125 AGRICULTURAL METHODOLOGY 2C

Effective teaching defined. Characteristics and qualities of a good agricultural science teacher. Teaching methods in agriculture. Classroom, field/practical and laboratory management. Avoidance and treatment of accident on the field and the laboratory. Special problems of agriculture in schools. Experience in scheme and plans of work. Lesson plan and micro-teaching. Lesson presentation skills. Forms of closure in agricultural lessons. Forms of communications and barriers to effective communication in the classroom. Development and usage of instructional materials and media in agriculture.

Strategies for handling multi-grade classes in agriculture. Application of ICT in the teaching of agriculture

AGE 126 INTRODUCTION TO SOIL SCIENCE 2C

Definition of soil. Soil components-mineral, air, organic matter and water. Types of rocks and minerals. Rock formation and weathering of rocks. Factors influencing soil formation, classification of soil. Properties of soil (texture, structure, aeration, temperature, $_{P}$H etc.). Soil profile. Principal soil groups of the world; soil orders, families etc. in Nigeria. Laboratory practical in determining soil composition, porosity, capillarity, organic matter, Cat ion Exchange Capacity etc must be carried out.

AGE 127 PRACTICAL AGRICULTURE II 1C

Routine management operations on school farm

Animal maintenance and care of slaughter slabs, cultural practices

Such as planting, irrigation, pruning, weeding, thinning, fertilizing, supplying, harvesting grading etc. Soil testing.

YEAR TWO – FIRST SEMESTER

AGE 211 TREE CROP PRODUCTION 2C

Meaning and importance of tree crop production.

Botany, culture, harvesting, processing and storage, marketing and utilization of major tropical tree crops such as: Cocoa, oil palm, cashew, coffee, kola, Shea-butter, rubber, mango, citrus, coconut, gum Arabic, neem tree and date palm. Problems and prospects of tree crop production in Nigeria

.AGE 212 POULTRY PRODUCTION 2C

Poultry production (meaning, scope, and purpose),

Systems of poultry keeping

Brooding and rearing of chicks, management of broilers and growers, management of layers and breeders.

Handling, care, grading and candling.

Incubators and incubation process.

Feeds and feeding.Hatchery management.

Record keeping in poultry.

AGE 213 INTRODUCTORY GENETICS 2C

Genetics (meaning, scope and application)

Genetic principles

Early conceptions about heredity (Pre-Mendelian genetic theories)

Mendelian Genetics

Chromosomes

Sex Inheritance

Genetic variability and heritability

Basic definition of population genetics. Basic concepts in genetic engineering, mutation and eugenics.

AGE 214 PRINCIPLES OF AGRICULTURAL ECONOMICS 1C

Meaning and scope of agricultural economics. Demand and Supply for agricultural goods and services. Production functions and the law of diminishing returns in agricultural production e.g eggs, yams and vegetables, etc.

Cost analysis and their implications in agricultural production.

AGE 215 FARM POWER AND MACHINERY 2C

Meaning and definition of farm power. Types and sources of farm power. Unit of measurements of force, work, energy and power. Measurement of engine power on the farm and their uses. Brief description of an internal combustion engine. Objectives of agricultural engineering. Scope of agricultural engineering. Improvement of farm mechanization. Maintenance of farm tools. Implements and machineries. Brief description and functions of tillage, cultivating, planting, fertilizing, processing and storage equipment. The tractor services and maintenance. Description and uses of PTO (Power-take-off-shaft). Uses and maintenance of the following farm implements

ï mould board and disc plough, harrows, ridgers inter-row cultivators, seeders, artificial fertilizer spreaders, broadcasters and spot placers. The action of each implement when in use in the field (operation) e.g. correct setting of implement.

AGE 216 CURRICULUM DEVELOPMENT IN AGRICULTURE 1C

Definition of curriculum . Types of curriculum. Curriculum process and evaluation in agricultural education. Drills in curriculum design in agriculture. Critique of the curriculum for primary and secondary school agriculture.

AGE 217 PRACTICAL AGRICULTURE III/FIELD TRIP 1C

Identification, collection and preservation of plants, weeds, livestock pest and disease specimen. Routine farm operation in livestock, identification of feeding stuff. Field trips to agricultural based establishments. Field reports

AGE 218 ANIMAL NUTRITION 1C

Meaning and scope of animal nutrition; water, carbohydrates, proteins, fats and oils - their functions within the animal body. Study of vitamins, minerals, enzymes, hormones, and coenzymes. The use of antibiotics, synthentic hormones and food additives. Feedstuff-their analysis and nutritive contents. Nutritional requirement of farm animals and their measurements. Types of ration and ration formulation.

YEAR TWO – SECOND SEMESTER

VTE 220 ENTREPRENEURSHIP IN VOCATIONAL AND TECHNICAL EDUCATION (2 CREDITS)

Concept of entrepreneurship. Types of Entrepreneurs. Entrepreneurial theory-venture growth, opportunity recognition and exploitation. Types of Risks and their management. Conditions for establishing a business. Forms of business ownership. Business and Technology - issues and problems. Financing business - new and old, including innovative techniques. Business finance and funding institutions site selection and location of a business. Business environment. Management and administration of small and medium businesses. The future of business and succession issues-case study. Pilot study and feasibility report. Elements of marketing and Market segmentation. Product development; Business and social responsibility - Government regulations/taxation. Auditing. Consumer behaviour society. Share-holders etc. Management functions. Human resource management and communications. Record keeping/book-keeping.

AGE 221 RESEARCH METHODOLOGY IN AGRICULTURAL EDUCATION 2C

Definition of research methodology.

Types of agricultural research. Types of research designs. Population, sample and sampling procedure. Hypothesis and statistical inferences.

Data collection/Instrumentation. Collation, analysis and presentation of results. Research problems. Sources of data. Research report format.

Writing research proposals and thesis in agricultural education.

AGE 222 SOIL FERTILITY 2C

Meaning of soil fertility. Chemical, physical and biological dynamics of soil minerals. Fertilizer types, rates, methods and times of application. Blending of fertilizer. General principles of soil management. Erosion and desertification problems and control. Methods of determining soil water levels. Soil nutrient losses and control. Soil nitrogen, phosphorous and potassium soil micro-organism. Soil ï nitrogen balance, cation exchange capacity. Soil $_{P}$H, liming and its importance. Earth worms and soil fertility

AGE 223 PRINCIPLES OF CROP PROTECTION 2C

Meaning, aims and scope of crop protection. Classification, identification, and importance of plant pathogens. Disease development and effects on crops. Types and major classes of pests. Useful farm insects. Basic morphology and physiology of insect pests. Identification of insect pests and their damage to crops. Principles of pests and disease control. Weeds ï classification,

identification and principles of control. Economic importance of rodents and birds.

AGE 224 CROP IMPROVEMENT 1C

Definition and objective of crop improvement. Application of Mendelian genetics to crop improvement. Genetic variability among crops. Centers of origin of major world crops. Plant breeding methods for self and cross-pollinated crops. Hybrids and synthetic development. Classes, multiplication and distribution of improved seeds.

AGE 225 LIVESTOCK PRODUCTION (RUMINANTS) 2C

Types and breeds of cattle, sheep and goats and their distribution in Nigeria. Major exotic breeds of ruminants in Nigeria. Systems of livestock rearing, breeding and feeding (ruminant management practices). Diseases parasites and their control. Problems of low production in Nigerian breeds of livestock. Potentials for increased meat and milk production. Housing and equipment. Keeping livestock records.

AGE 226 PRINCIPLES OF FARM MANAGEMENT 2C

Definition and scope of farm management. Role of the management functions in agricultural production. Farm inputs (land, labor, capital and entrepreneurship) relationship and management, farm records and control. Farm planning methods. Cost benefit analysis. Farm profits and financial statements, risks and uncertainties in agricultural production.

AGE 227 PRACTICAL AGRICULTURE IV/FIELD TRIP 2C

Intensive involvement in school farm. Crop management practices. (seed bed preparation, planting, thinning, fertilizer application, staking, harvesting , processing and storage, deworming, castration, dipping, etc.). Students to have individual farm plots to be graded. Students to keep farm dairy. Field trip to agricultural based establishments. Organizing and participation in agricultural shows and exhibitions.

AGE 229 SIWES 2C

YEAR THREE: FIRST SEMESTER -TEACHING PRACTICE

YEAR THREE – SECOND SEMESTER

VTE 310 ENTREPRENEURSHIP IN AGRICULTURAL EDUCATION (2 CREDIT)

Concepts and Principles of entrepreneurship

- Economic empowerment through agriculture
- Identifying business opportunities in agriculture
- Feasibility study ï concepts, principles and features ï executive summary, business idea, location, marketing plan, staffing, legal responsibilities, financial planning ï costing, sales and cash flow
- Starting up capital ï types and sources, cost quantification-input/output analysis.
- Record keeping
- Sourcing information for agro business
- Practical entrepreneurial skill acquisition in agro business

- Writing of feasibility study
- Implementation of agro business ideas ï areas of interest include crop production horticulture, livestock production, snail rearing, cane rat farming, bee keeping, fish farming etc.
- A written report of the various activities is needed at the end of the course

NB Emphasis in this course on acquisition of practical skills. Students should be graded hundred percent on the basis of their performance in running agro business.

AGE 311 LIVESTOCK PRODUCTION II (NON-RUMINANTS) 2C

Meaning and importance of non-ruminants in livestock production. Breeds and classification according to uses. Performance efficiency of different breeds. Reproductive behavior and breeding methods. Feeds and feeding systems. Management of young, growing animals, adults and breeding animals. Housing and construction of simple pens. Diseases, parasites and their control.

AGE 312 ANIMAL BREEDING 2C

Definition, aims and objectives of animal breeding. Selection and mating systems. Parameters for selection. Types of mating. Breeding systems (inbreeding, crossbreeding, etc.). Breed significance and up-grading. Artificial insemination and its importance. Castration and caponisation. The basic definition of population genetics. Breeding for special characteristics.

AGE 313 PASTURE AND RANGE MANAGEMENT 1C

Definition of pasture and range. Differences between the two. Classification of pasture and range. Composition of pasture and range. Identification of pasture plants and range plants. Nutritive values of pastures and range. Utilization of pastures and range by ruminants. Establishment, management and maintenance of pasture and range. (clearing, bed preparation, planting and maintenance, etc.) Preservation of feedstuff, pastures and range (hay, silage and straws).

AGE 314 FISH PRODUCTION 2C

Integrated fish farming. Fishing gears and accessories.

Importance of fisheries in the development of Nigerian economy. Classification, morphology, development and distribution of main groups of fishes. Management of fish, fish ponds and lakes. Breeding and migration of fresh water fishes. Identification, prevention and control of fish diseases. Methods of fish harvesting. Impact of man-made lakes on fishring development in Nigeria. History of fishry in Nigeria. Practical fish pond construction and maintenance, hatchery in fish production, feeds and feeding fish in the pond, fish preservation methods.

AGE 315 AGRICULTURAL MARKETING AND CO-OPERATIVES 1C

Definition of marketing. Kinds of markets and market situations. Marketing institutions. Market structure, conduct and performance. Price determination and factors affecting prices of agricultural commodities. Agriculture in stock exchange. Price Control. The roles of commodity associations and marketing outlets. Export promotion in agriculture. Characteristics of agricultural production in relation to marketing, problems of agricultural marketing. Definition of co-operatives, types and principles of co-operatives. Co-operative laws. Formation of co-operatives and roles of co-operatives in marketing agricultural products.

AGE 316 AGRICULTURAL FINANCE 1C

Meaning and scope of agricultural finance. Agricultural costs. Sources of farm financing. Agricultural credit and implications. The effect of taxes and subsidy

on agricultural finance. Capital formation and agricultural finance institutions. Agricultural insurance.

AGE 317 LAND SURVEY AND FARMSTEAD PLANNING

1C

Meaning of land survey, farm survey and farmstead planning. Farm surveying ï units of measurements and techniques. Tools and equipment used in land surveying. Simple chain survey, traverse survey and leveling. Problems of land surveying and how to overcome them. Uses of surveys in agriculture. Farm layout. Housing and environmental control (factors to consider when planning a farm layout). Important features of farm structures. Methods of environmental control in livestock housing.

AGE 318 INTRODUCTION TO RURAL SOCIOLOGY & AGRICULTURAL EXTENSION

1C

Definition of rural sociology. Sociology as a science. Social organizations and social institutions. Social action processes and their nature. Characteristics of rural organizations. Values and norms. Rural-urban differentials. Definition and objectives of agricultural extension. Duties and qualities of extension work. Communication and diffusion processes in agriculture. Extension administration in Nigeria. Principles and philosophy of agricultural extension in Nigeria. Problems of agricultural extension in Nigeria. Functions of agricultural extension. Adoption process of a new technology in agriculture.

AGE 320 SEMINARS IN AGRICULTURAL EDUCATION

There should be weekly seminars in agricultural Education under the guidance of a qualified academic staff. In the seminars, students should demonstrate the use of assorted means of presenting data. They should also demonstrate seminar ethics and presentation skills. Seminar assessment should take into account:

- Relevance of the topic
- Clarity of expression
- Focus on the subject matter
- Quality of recommendations
- Referencing style
- Any other relevant yardstick

AGE 321 ENVIRONMENTAL EDUCATION IN AGRICULTURE 1C

Concept of environmental education in agriculture. Definition of forest and wildlife management. Economic importance of forest and wildlife. Nigerian vegetation and forest zones. Basic principles of agro-forestry. Identification, establishment and maintenance of major economic forest trees. By-products of forest and forest trees. Concepts of wildlife conservation. Reasons for studying wildlife management. Management and conservation techniques in wildlife.

The concept of ecosystem, anatomical, physiological and genetic factors influencing animal adaptation. Environmental factors and animal population dynamics. Causes and effects of environmental degradation in farms. Planting and maintenance of ornamental plants. The state and the resources of the environment. Environment laws, agencies and programmes in Nigeria.

AGE 322 ANIMAL HEALTH 2C

Definition of animal health and diseases. Principles of health and disease management. Different types of diseases (infectious, non-infectious, parasitic, metabolic, genetic behavioural, thermal, etc.). Causes of disease e.g. living organisms, fungi, bacteria, protozoan, viruses. Immunity and immune systems. Types of immunity. Principles of disease prevention. Methods of disease control ï segregation, quarantine, disinfection and vaccination. Some diseases of livestock e.g. ones caused by bacteria, viruses, protozoa and fungi, etc.
(at least one for each type of livestock and poultry).

AGE 323 FOOD PRODUCTS TECHNOLOGY 2C

Definition of animal and crop products technology. Importance of animal and crop products technology. Definition of storage. General guiding principles in storage. Types of storage. Merits and demerits. Methods of improvement of storage. Storage losses and factors. Slaughtering techniques, dressing and dressing percentages. Meat types. Methods of preservation of meat, poultry, eggs, milk and milk products e.g. smoking, salting, freezing, drying, etc. methods of preservation of tubers, grains, fruits, vegetables, etc

` AGE 324 BASIC AGRICULTURAL WATER ENGINEERING 2 C

Meaning and importance of water engineering in agriculture. Sources of water. Soil and water conservation. Prevention of soil erosion. Irrigation systems, installation and maintenance of irrigation. Classification of soil water table. Field investigation for drainage. Water drainage and control. Types and advantages of drainage systems. Problems associated with irrigation and drainage. Water harvest and management

AGE 325 HORTICULTURE 2C

Definition, classification, principles and practice of horticulture. Characteristics of horticultural crops. Cultivation, harvesting, sorting, grading, storage, processing, utilization and marketing of some horticultural crops. Vegetables- Types of vegetable, growing, classification and cultivation. Leaf(Amaranths, lettuce, cabbage etc). Fruit (Tomatoes, peppers, okra etc).Roots(carrot, beets, onions, ginger etc). Fruit trees (pawpaw, pineapple, mango, citrus, guava, pear etc).Ornamental gardening. Processing of ornamental and principles of decoration.

Landscaping - Home, school and public landscaping. Principles of landscape designs, structural and plant materials. Nursery - seed trays, pre-nursery, seed treatment, transplanting, double digging, and composting.

Maintenance of seedlings. Identification of wreath decoration plants. Students are required to prepare and maintain vegetable beds, seed trays and ornamental cuttings. .

AGE 326 AGRICULTURAL DEVELOPMENT & POLICY 1C

Meaning of development and growth. Characteristics of Nigerian agriculture. Theories of agricultural development. Rural development policies, strategies and models. Community development policies, strategies and models. Trends in the development of agriculture in Nigeria.

AGE 327 BEE KEEPING/FARMING 1C

Bee as a social insect. Usefulness of bees. Biology of honey bee. Life cycle of bees. Feeding and swarm control methods Queen/Stock raising. The hive, essential equipment

for honey collection. Honey production and harvesting. Bee pests and diseases. Bee keeping in schools. Hive products and uses.

OR

AGE 327B SNAIL FARMING 1C

Snail farming in Nigeria. Snail as mini-livestock. Classification of snails. Anatomy and physiology of snails. Establishing a snail farm. Management of snails (housing, feeding, breeding, disease and pest control). Harvesting, processing preservation and marketing of snails.

OR

AGE 327C CANE RAT FARMING 1C

Objectives of cane rat farming. Principles of site selection, feeding, housing, hygiene and disease management, marketing and processing.

APPENDIX 3

LETTER OF REQUEST FOR VALIDATION OF RESEARCH OF INSTRUMENTS

Department of Vocational Teacher Education

University of Nigeria

Nsukka.

_____

_____

_____

Dear Sir/ Madam,

REQUEST FOR VALIDATION OF RESEARCH INSTRUMENTS

I am a Ph.D student of the above named Department currently conducting a research titled ñIntegration of Indigenous Agricultural Knowledge and Practices (IAKP) into Nigeria certificate in Education (NCE) Agricultural Education Curriculumò. Kindly read through the attached interview schedule and questionnaire and assess their validity. Also attached is a copy of the purpose of the study, research questions and hypotheses for your guidance.

Your comments, suggestions and constructive criticisms on each item which could enhance the validity of the instruments will be highly appreciated.

Yours Faithfully

_____

Ejiofor, Toochukwu. E.

Validates Comment: _____

_____

_____

NAME: _____

SIGNATURE:_____DATE:_____

APPENDIX 4

REQUEST FOR RESPOND TO QUESTIONNAIRE.

Department of Vocational Teacher Education
University of Nigeria
Nsukka.

Dear Respondent,

Request to Respond to Questionnaire

I am a postgraduate student in the above named Department currently undertaking a research project titled ñIntegration of Indigenous Agricultural Knowledge and Practices (IAKP) into Nigeria Certificate in Education (NCE) Agricultural Education Curriculumò.

The attached questionnaire schedule is to elicit the necessary information for the said project. You are please requested to respond to the items as objectively as possible. Every information supplied will be treated confidential and will be used strictly for this research.

Thanks for your cooperation

Yours Faithfully

_____

Ejiofor, Toochukwu. E.

APPENDIX 5

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
item1	267	1	4	3.77	.502
item2	267	1	4	3.67	.610
item3	267	2	4	3.63	.564
item4	267	1	4	3.56	.561
item5	267	1	4	3.52	.603
item6	267	2	4	3.65	.610
item7	267	2	4	3.71	.571
item8	267	2	4	3.80	.469
item9	267	1	4	3.58	.738
item10	267	1	4	3.82	.501
item11	267	2	4	3.56	.588
item12	267	2	4	3.66	.498
item13	267	2	4	3.63	.528
item14	267	2	4	3.51	.639
item15	267	1	4	3.27	.713
item16	267	1	4	3.14	.704
item17	267	1	4	3.25	.621
item18	267	1	4	3.22	.798
item19	267	1	4	3.21	.682
item20	267	1	4	3.57	.587
item21	267	1	4	3.50	.833
item22	267	1	4	3.21	.750
item23	267	1	4	3.31	.899
item24	267	1	4	3.57	.698
item25	267	1	4	3.39	.708
item26	267	1	4	3.40	.614
item27	267	1	4	3.36	.631
item28	267	1	4	3.21	.784
item29	267	1	4	3.08	.854
item30	267	1	4	3.49	.584
item31	267	1	4	3.52	.679
item32	267	1	4	3.24	.795
item33	267	1	4	3.46	.650
item34	267	1	4	3.50	.639
item35	267	1	4	3.40	.715
item36	267	1	4	3.28	.596
item37	267	1	4	3.35	.585
item38	267	1	4	3.36	.647
item39	267	1	4	3.18	.674
item40	267	1	4	3.36	.636
item41	267	1	4	3.25	.890
item42	267	1	4	3.60	.633
item43	267	1	4	3.53	.859
item44	267	1	4	3.57	.789
item45	267	1	4	3.47	.684
item46	267	1	4	3.48	.727
item47	267	1	4	3.49	.668
item48	267	1	4	3.45	.677
item49	267	1	4	3.46	.689
item50	267	1	4	3.36	.825
item51	267	1	4	3.47	.684
item52	267	1	4	3.50	.706
item53	267	1	4	3.39	.750
item54	267	1	4	3.31	.869

item55	267	2	4	3.45	.555
item56	267	2	4	3.49	.621
item57	267	1	4	3.37	.700
item58	267	1	4	3.45	.694
item59	267	1	4	3.58	.585
item60	267	1	4	3.38	.851
item61	267	1	4	3.33	.890
item62	267	1	4	3.34	.817
item63	267	1	4	3.51	.679
item64	267	2	4	3.51	.690
item65	267	1	4	3.58	.635
item66	267	1	4	3.75	.603
item67	267	2	4	3.68	.620
item68	267	1	4	3.23	.883
item69	267	1	4	3.28	.883
item70	267	1	4	3.17	.766
item71	267	1	4	3.55	.556
item72	267	1	4	3.67	.622
item73	267	1	4	3.08	.863
item74	267	1	4	3.24	.863
item75	267	1	4	3.45	.715
item76	267	1	4	3.54	.583
item77	267	2	4	3.58	.610
item78	267	2	4	3.70	.528
item79	267	1	4	3.63	.555
item80	267	1	4	3.47	.615
item81	267	1	4	3.37	.727
item82	267	1	4	3.03	.941
item83	267	1	4	3.32	.747
item84	267	1	4	3.50	.578
item85	267	1	4	3.41	.621
item86	267	2	4	3.61	.580
item87	267	2	4	3.74	.554
item88	267	2	4	3.72	.520
item89	267	1	4	3.55	.643
item90	267	1	4	3.58	.674
item91	267	1	4	2.94	.888
item92	267	1	4	3.36	.718
item93	267	1	4	3.47	.577
item94	267	1	4	3.43	.687
item95	267	1	4	3.38	.685
item96	267	1	4	3.44	.677
item97	267	2	4	3.43	.612
item98	267	1	4	3.27	.797
item99	267	1	4	3.21	.683
item100	267	1	4	3.07	.947
item101	267	1	4	3.79	.709

item102	267	1	4	3.39	.760
item103	267	1	4	3.42	.701
item104	267	2	4	3.61	.560
item105	267	1	4	3.53	.639
item106	267	2	4	3.51	.537
item107	267	1	4	3.32	.620
item108	267	1	4	3.22	.720
item109	267	1	4	2.78	.986
item110	267	1	4	3.61	.611
item111	267	1	4	3.55	.736
item112	267	1	4	3.47	.747
item113	267	1	4	3.40	.761
item114	267	1	4	3.41	.706
item115	267	1	4	3.13	.839
item116	267	1	4	2.85	.857
item117	267	1	4	3.06	.924
item118	267	1	4	3.37	.660
item119	267	1	4	3.34	.736
item120	267	1	4	3.40	.661
item121	267	1	4	3.17	.751
item122	267	1	4	3.22	.631
item123	267	1	4	2.99	.880
item124	267	1	4	2.97	1.029
item125	267	1	4	3.09	.960
item126	267	1	4	3.35	.685
item127	267	1	4	3.40	.721
item128	267	1	4	3.42	.697
item129	267	1	4	3.25	.709
item130	267	1	4	3.23	.831
item131	267	1	4	2.92	.800
item132	267	1	4	2.87	.919
item133	267	1	4	3.15	.884
item134	267	1	4	3.35	.787
item135	267	1	4	3.48	.621
item136	267	2	4	3.59	.577
item137	267	1	4	3.34	.766
item138	267	1	4	3.37	.667
item139	267	1	4	3.15	.766
item140	267	1	4	2.88	.975
item141	267	1	4	3.10	.968
item142	267	1	4	3.51	.685
item143	267	1	4	3.55	.694
item144	267	1	4	3.54	.644
item145	267	1	4	3.40	.766
item146	267	1	4	3.48	.690
item147	267	1	4	3.17	.836
item148	267	1	4	2.89	.994
item149	267	1	4	3.13	.894
item150	267	1	4	3.58	.658
item151	267	2	4	3.77	.432
item152	267	2	4	3.83	.388
item153	267	2	4	3.46	.706
item154	267	1	4	3.60	.673
item155	267	2	4	3.60	.613
item156	267	2	4	3.55	.582
item157	267	2	4	3.55	.625
item158	267	2	4	3.70	.475
item159	267	1	4	3.59	.621
item160	267	2	4	3.54	.638
item161	267	2	4	3.68	.514
item162	267	2	4	3.64	.553
item163	267	2	4	3.61	.653
Valid N (listwise)	267				

APPENDIX 6
RELIABILITY COEFFICIENT

SECTION A

Reliability Statistics

Cronbach's Alpha	N of Items
.919	9

SECTION B

Reliability Statistics

Cronbach's Alpha	N of Items
.845	52

SECTION C

Reliability Statistics

Cronbach's Alpha	N of Items
.877	48

SECTION D

Reliability Statistics

Cronbach's Alpha	N of Items
.818	40

SECTION E

Reliability Statistics

Cronbach's Alpha	N of Items
.907	14

OVERALL RELIABILITY

Reliability Statistics

Cronbach's Alpha	N of Items
.901	163

APPENDIX 7
POPULATION AND SAMPLE DISTRIBUTION OF THE STUDY

STATE	TOWNS SELECTED	AGED FARMERS	NO OF EXTENSION AGENTS	50% OF EA SAMPLED	COLLEGE OF EDUCATION	NO OF LECTURERS
ABIA	EZIAMA	12	117	59	College of Education (Technical) Arochukwu	8
ANAMBRA	UMUNZE	12	36	18	Nwafor Orizu College of Education Nsugbe. Federal College of Education (Technical) Umunze	15 12
EBONYI	EZILLO	12	76	38	Ebonyi State College of Education Ikwo	17
ENUGU	IBEAGWA - AKA	12	43	22	College of Education (Technical) Enugu. Federal College of Education Eha-Amufu	4 12
IMO	IBI- NTA	12	89	45	Alvan Ikoku College of Education Owerri	17
TOTAL		60	361	182		85

APPENDIX 8
IAKP PICTURES

LOCAL PAW PAW VARIETY

AMARANTHUS CULTIVATED WITH ANIMAL DUNG

IAKP: PALM WINE TAPPING

IAKP: YAMS STORED IN THE BARN.

INDIGENOUS GOAT SPECIE

INDIGENOUS GOAT SPECIES IN A FREE RANGE

KEY INFORMANT

KEY INFORMANT

THE RESEARCHER IN A FOCUS GROUP DISCUSSION

KEY KEY INFORMANT WITH THE RESEARCHER AND HIS ASSISTANT

FOCUS GROUP DISCUSSION (FGD)

FOCUS GROUP DISCUSSION (FGD)