Assessment of the Level of ICT Application in Agricultural Production in Colleges of Education in South Eastern Nigeria

EKEAGWU, Mary Nwadinuba
Department of Vocational Education
(Agricultural Science Unit)
Delta State University, Abraka, Nigeria

ABSTRACT
This study focused on the extent of Information and Communication Technology (ICT) application in agricultural production and marketing of farm produce in agricultural education in the Colleges of Education in South Eastern Nigeria. Specifically, the study aimed at finding out the level of ICT application in agricultural production, marketing of farm yields, record keeping and factors militating against ICT application in the study area. This study was a descriptive research which employed survey design. A total of 501 respondents, comprising of all agricultural education lecturers and the regular students in the nine Departments of Agricultural Education of Colleges of Education in South Eastern States responded to a structured questionnaire validated by experts from Delta State University, Abraka. These colleges comprised of three federal colleges of education, five state colleges of education and one private college of education. The reliability of the instrument was established using split half technique which yielded a Cronbach alpha value of 0.90. Means and standard deviation were used to describe the data collected. The results revealed the following: The nine departments of agricultural education are poorly equipped with ICT while respondents utilize their personal purchased ICT tools. Many problems militate against ICT application in agricultural production in the study area. There is high ICT application level in the areas of record keeping, agricultural production and marketing of farm yields among the respondents. ICT like mobile phone, SMS, e-mail, radio, laptop, desk top computer, television have made remarkable impact in agricultural information dissemination. Based on the findings of this study, the following recommendations were made; Government and the stakeholders at this level of education should endeavor to provide the needed ICTs for agricultural instruction and ensure that they are utilized. ICT training program should be organized for lecturers on regular basis by the government to ensure effective application of ICT in agricultural education in the Colleges of Education in South Eastern Nigeria.

Keywords: Assessment, ICT, Application, Agricultural Production, Record Keeping, Agricultural Education, College Education.

INTRODUCTION
The role of agriculture in economic development has long been recognized (Aker, 2010). Agriculture can play a unique role in reducing poverty, assorted job creation and serve as an important engine for growth in developing countries. Education is looked upon to help improve agriculture as well as enable her achieve the desired goals hoped for. Lawal (2004) reported that education no doubt can bring positive changes in the human society, but the potentials of education have to be tapped in a balanced way for true development to occur. Agricultural production in a broad sense implies the production of crops and farm animals that are useful to human beings. It further involves gathering, processing, recording, storing, distributing, sells of farm yields and provision of raw materials for local and foreign industries. It is in fact the practical aspect of agricultural education that utilizes all the skills and knowledge already imparted in the students within the three areas of domains (cognitive, affective and the psychomotor) for the production of crops and livestock in the farm. In this twenty-first century, meaningful agricultural
production involves using the internet to access relevant agricultural information, retrieve, download, record, disseminate and communicate useful farm ideas about crops and livestock production, processing, storing among farmers and marketing of farm yields using Information and Communication Technology (ICT).

Increase in global population, high demand for food items, expansion and diversification in industries that utilize agricultural produce have placed more pressure on demand for agricultural outputs. Feeding rapid growing population will require a 70% increase in food production (FAO, 2009). These are challenges facing agricultural production today. Hence, there is need for agricultural education to revolutionize its production sector pattern in order to meet up the challenges. Agricultural education is looked upon to transform the production sector through the production of competent literate farmers who can take the bull by the horns and transform agricultural production sector. Agricultural education according to Phipps, Osborne, Dyer and Ball (2008) is a systematic instruction in agricultural and natural resources at the elementary, middle school, secondary, post secondary or adult level for the purpose of (i) preparing people for entry or advancement in agricultural occupations and professions (ii) job creation and entrepreneurship and (iii) agricultural literacy. This is achieved through diversity of programs in agriculture that leads to the development of individual three domains. The National Policy on Education (FRN, 2004) remarked that the teaching and learning of agriculture emphasize acquisition of appropriate knowledge, competencies and skills which will make for proficiency in agricultural occupations. This means, agricultural education makes its recipient useful and productive in agriculture. The noble goals of agriculture can be attained if the lecturers are able to expose the students adequately to the innovation that is capable of transforming agricultural education in general and production sector in particular. The need for ICT literate lecturers and involvement in the utilization of these tools is necessary to avoid leaving the technology to control the lessons. Brandl (2002) noted that ICT can be effective only with the teacher’s role as a facilitator who plans and guides the lesson. McLaren et al (2005) stressed that the teacher must also be prepared to assume new roles. This is important since the use of ICT tools for agricultural education depends upon the attitudes of lecturers toward the technology. Their positive attitudes toward ICT are an essential factor that can shape the effective utilization of ICT to transform agricultural education.

The introduction and application of ICT in agricultural education is well timed. ICT has been utilized in different aspects of agricultural education at the Colleges of Education level in the South Eastern Nigeria. The purpose is to utilize this innovative tool to transform the various academic sections in agricultural education such as instruction, record keeping, research, agricultural production and marketing of farm yields. ICT therefore, is a diverse set of technologies and resources used to communicate, create, disseminate, store, retrieve and manage information (Inije, 2012). These technologies include computers, internet, broadcasting technology, telephone, e-mail device, mobile phones among others. Gusen (2007) emphasized that agricultural education requires the use of ICTs to find, store, explore, access and analyze creatively and with discrimination while teachers only need to involve and guide students. Dafwang (1999) revealed that a difference exist between Nigeria and Israel in the area of agricultural production. He stressed that the major factor responsible is the extent to which ICT is harnessed and utilized in agricultural production in Israel which is not so in Nigeria. This suggested that the application of ICT in agricultural production among farmers in Nigeria is yet to be properly harnessed. Therefore, the use of ICT in Nigeria agricultural production in the study area is very important and necessary, and especially if the potentials of human and natural resources that are abound in the study area can be properly channeled and utilized into this area of Nigeria economy.

**Theoretical Framework**

This study is hinged on Rogers (1995) Diffusion of Innovation Theory which explains what an innovation means, how it diffuses and adopted among a people. According to Rogers an innovation is a product, idea and behavior that is new. Diffusion implies how an innovation spread, and how the target population begins to utilize something that is new and does something differently from what they had previously
been used is the adoption. He stressed that adoption of an innovation is not simultaneous in a social system or target population instead it is a process whereby people are more apt to adopt the innovation than others. He categorized the social system and their level of zeal to adopt innovation into five groups such as innovator, early adopter, early majority, late majority and the laggards. This theory was adopted into this study because of its similarity and relevance in explaining how ICT, an innovative tool diffused and was adopted by various categorizes of persons and institutions in the study area. For this study ICT is an innovation, the general acceptance and widespread of ICT in the study area is the diffusion while its application in agricultural production and marketing of farm yields in agricultural education is the adoption. Also the adoption of ICT in the study area was not simultaneous rather a process whereby respondents (individuals) and the institutions are more apt to adopt the ICT tools than others.

![Adopters and Time of Adoption of Innovation](source.jpg)

This Figure 1 represents, as well as explains how the participants (respondents) were grouped into the decision or implementation stage based on their current level of utilizing ICT for agricultural production in Colleges of Education in South Eastern Nigeria.

ICT has played outstanding role in today’s agricultural production and marketing of farm yields globally. Oviawe and Ojo (2009) stated that some advanced nations have achieved great height in agricultural education and production through the instrumentality of education, ICT and competent educators. Access to ICT can help farmers in a number of ways. The ICTs are capable of directing farmers and all those engaged in agro businesses to where to meet their various needs relating to agricultural production, processing and marketing of farm commodities. The internet provides useful agricultural information on farming, check market prices, weather reports, SMS disease alert and news (Anonymous, 2011). Traditional media (radio, television and newspaper) and new ICTs (cell phones, internet, computers, SMS etc) have played prominent role in diffusing agricultural information to rural communities (Munyua, 2000). Through ICT information about better farming methods, crops and livestock husbandry (fish, poultry, ruminant and non-ruminant animals), livestock feed analysis and feed formulation process can be obtained. Information on where to purchase improved planting materials, livestock breeds and other farm inputs can be accessed, purchased and used. Better marketing channels and price situation for farm yields can be identified quickly using ICTs. In Nigeria, ICT helps to communicate vital agricultural information to farmers, farm workers and those engaged in agricultural related business (Agro- businesses). ICT has also helped to notify farmers and the general public about natural hazards. For instance flood incident in 2013, outbreak of bird flu in 2013 and 2015 in Nigeria as well as their control measures was made known to farmers and the public through ICTs such as radio, television, cell phone, e-mail and short message services (SMS).

Agricultural production and marketing of farm yields will require record keeping. Record keeping is important and necessary in agricultural education as a course and as well as in production centre. As a
A course of study, institutions of learning keep different types of records like admission, class register, school fees, result booklet, scheme of work, diary, movement book, time book and visitor’s book. Agricultural is a viable and very lucrative business that entails expansion and diversification of business outfit, hence record keeping is highly needed. This is because productions and marketing of farm commodities involve a lot of transactions which has to do with humans, produce (farm yields), cash, sales and expenditure. Also students need to know the various types of farm records kept by farmers and how they are designed. The types of records kept in agricultural production include, diary, inventory, input, crop production, livestock production, crop yields, livestock yields, sales, expenditure among others. It is important to note that keeping records of all the activities that takes place in the farm is very necessary to farm managers and the farm enterprise in general. Record keeping is important for the smooth running of an institution or business organization. It is very useful for taxation, loan and insurance purposes. For institutions and farm business to be effectively and efficiently managed, their operations must be properly recorded and kept. Ikpe (2002) remarked that records are necessary elements in the information system which supports the activities of an organization. He stressed that no organization can function effectively and efficiently when record administration is not given proper attention. Record administration implies the act of preserving essential records accurately in organization and subsequent speedy retrieval of information for decision making (Opedus, 1992). According to Oko and Uko-Avion (2008) ICT is an indispensable tool for record keeping. The result of crop yields and livestock products from a particular crop or animal can be saved in computer and used later when needed. They further noted that ICT like computer, laptops, mobile phones, CD ROM, Flash drive, ipads help in keeping records of crop and farm animals yields, livestock stocking and medication among others. Lack of institutional ICT tools for agricultural instruction, internet access problem, high cost of ICT, electricity problems were some of the identified factors hindering the effective application of ICT in agricultural production and marketing of farm yields.

Despite the numerous constraints, lecturers and the students still possess and utilize some of these innovative tools for agricultural education. They also utilized these facilities in agricultural production, marketing of farm produce and in record keeping, but the level to which the students and their lecturers have applied these facilities is unknown. This is the gap which this study sought to fill. Hence, this study sought to find out the level of ICT application in agricultural production in the Department of Agricultural Education at the Colleges of Education in South Eastern Nigeria.

**Research Questions:**

The study intends to find answers to the following research questions:

1. What is the extent of ICT application in agricultural production and marketing of farm yields in Colleges of Education in South Eastern Nigeria?
2. What is the level of ICT application in record keeping in agricultural education in departments of agricultural education?
3. What constraints were faced by the Colleges of Education with respect to application of ICT in agricultural production and marketing of farm yields in agricultural education in South Eastern Nigeria?

**RESEARCH METHODOLOGY**

This study employed descriptive research survey design. The population of the study comprised all the agricultural education lecturers and the regular students in the nine departments of agricultural education, in the nine Colleges of Education in South Eastern Nigeria. These colleges comprised of three federal colleges of education, five state colleges of education and one private college of education. A total of 501 agricultural education lecturers and students which represented the entire population responded to a 25 item structured questionnaire titled Assessment of the level of ICT application in Agricultural Production in Colleges Education (ALICTAAPCE). The instrument was validated by five experts, two of whom were the thesis supervisors, two senior lecturers from agricultural education and one from measurement and evaluation. Reliability of the instrument was established through a pilot test, and data generated thereof was subjected to split half technique and Cronbach Alpha analysis which yielded a coefficient of 0.90.
For data to be collected 501 copies of the questionnaire was administered to the respondents by the researcher and two research assistants. A total of 470 well filled copies were retrieved representing 96% return rate. Means and Standard deviation were used to describe the data collected. Statistic package for social science (SPSS) version 20 was used for the analysis of this study.

RESULTS

The results of this study are as presented below:

Table I: Responses of the Lecturers and the Students on the extent of ICT application in Agricultural production and marketing of farm yields (N = 470).

<table>
<thead>
<tr>
<th>S/N</th>
<th>Items</th>
<th>Lecturers (N=64)</th>
<th>Students (N=406)</th>
<th>Combined/Overall (N=470)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Access market situation and better marketing channels for farm yields</td>
<td>3.6406 .48361</td>
<td>3.1650 .81338</td>
<td>3.2298 .76334</td>
<td>HL</td>
</tr>
<tr>
<td>2</td>
<td>Contact cheap and reliable farm workers</td>
<td>3.6250 .48795</td>
<td>3.2734 .70737</td>
<td>3.3213 .69185</td>
<td>HL</td>
</tr>
<tr>
<td>3</td>
<td>Contact agricultural marketing agents</td>
<td>3.5000 .50395</td>
<td>3.2660 .72567</td>
<td>3.2979 .70378</td>
<td>HL</td>
</tr>
<tr>
<td>4</td>
<td>Browse for improved varieties of crops and livestock breeds.</td>
<td>3.5000 .50395</td>
<td>3.1995 .78699</td>
<td>3.2404 .76131</td>
<td>HL</td>
</tr>
<tr>
<td>6</td>
<td>Find out where to purchase high quality farm inputs and at a cheap rate</td>
<td>3.6250 .51946</td>
<td>3.2512 .76072</td>
<td>3.3021 .74327</td>
<td>HL</td>
</tr>
<tr>
<td>7</td>
<td>Notify farmers about pests and diseases outbreak on either crops or farm animals.</td>
<td>3.9531 .21304</td>
<td>3.4335 .51569</td>
<td>3.5043 .51727</td>
<td>HL</td>
</tr>
</tbody>
</table>

Source: Field work 2014.

Key – High Level (HL) and Low Level (LL).

Table 1 shows the level at which the four hundred and seventy (470) respondents has applied ICT in agricultural production and marketing of farm outputs in the study area. The 7 items had mean values which ranged from 3.2–3.9 with an indication of High Level (HL) application.

Table 2: Responses of the Lecturers and the Students on the Level of ICT Application in Record keeping in agricultural production and marketing of farm yields in Agricultural Education (N=470).

<table>
<thead>
<tr>
<th>S/N</th>
<th>Items</th>
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<th>Combined/Overall(N=470)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Farm inventory</td>
<td>3.5938 .49501</td>
<td>3.1330 .85609</td>
<td>3.1957 .83115</td>
<td>HL</td>
</tr>
<tr>
<td>9</td>
<td>Farm diary</td>
<td>3.6406 .51539</td>
<td>3.1182 .83788</td>
<td>3.1894 .82103</td>
<td>HL</td>
</tr>
<tr>
<td>10</td>
<td>Record of parturition in various farm animal breeds</td>
<td>3.5625 .53080</td>
<td>3.1379 .81389</td>
<td>3.1957 .79443</td>
<td>HL</td>
</tr>
<tr>
<td>11</td>
<td>Record of annual farm yields</td>
<td>3.9062 .29378</td>
<td>3.2611 .73422</td>
<td>3.3489 .72538</td>
<td>HL</td>
</tr>
<tr>
<td>12</td>
<td>Record of livestock and crop in the farm</td>
<td>3.7500 .50395</td>
<td>3.2783 .67687</td>
<td>3.3426 .67525</td>
<td>HL</td>
</tr>
<tr>
<td>13</td>
<td>Record of vaccination and its administration</td>
<td>3.5156 .53429</td>
<td>3.1355 .83378</td>
<td>3.1872 .80975</td>
<td>HL</td>
</tr>
<tr>
<td>14</td>
<td>Record of farm account</td>
<td>3.7500 .47140</td>
<td>3.2463 .75583</td>
<td>3.3149 .74370</td>
<td>HL</td>
</tr>
<tr>
<td>15</td>
<td>Farm budgets</td>
<td>3.6875 .50000</td>
<td>3.1970 .80160</td>
<td>3.2638 .78537</td>
<td>HL</td>
</tr>
</tbody>
</table>

Source: Field work 2014.
The analysis on Table 2 shows the level of ICT application in the area of record keeping in agricultural education among lecturers and students. The respondents rated the 8 items far above 2.50 with mean scores which ranged from 3.1--3.9. Also from the combined result presented, item 11 has the highest mean value of 3.9 while item 12 had the overall lowest standard deviation value of .68. This is an indication that the respondents agreed on the 8 items as areas where records are kept in agricultural production and marketing of farm outputs.

Table 3: Responses of the Lecturers and the Students on the constraints faced by Colleges of Education with respect to Application of ICT in Agricultural Production and Marketing of farm goods in Agricultural Education (N=470).

<table>
<thead>
<tr>
<th>S/N</th>
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<th>Students (N=406)</th>
<th>Combined/Overall (N=470)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>High cost of assorted ICTs</td>
<td>3.7187</td>
<td>.45316</td>
<td>3.3202 .65992</td>
</tr>
<tr>
<td>17</td>
<td>High cost of alternative power supply</td>
<td>3.5000</td>
<td>.56344</td>
<td>3.2069 .73471</td>
</tr>
<tr>
<td>18</td>
<td>Poor electricity supply</td>
<td>3.8750</td>
<td>.33333</td>
<td>3.4557 .52282</td>
</tr>
<tr>
<td>19</td>
<td>Poor ICT knowledge and skills among lecturers.</td>
<td>3.6094</td>
<td>.49175</td>
<td>3.1724 .79183</td>
</tr>
<tr>
<td>20</td>
<td>Poor internet infrastructures and access problem.</td>
<td>3.6875</td>
<td>.49175</td>
<td>3.2808 .72007</td>
</tr>
<tr>
<td>21</td>
<td>Lack of well-equipped computer classroom</td>
<td>3.8125</td>
<td>.50000</td>
<td>3.3621 .65126</td>
</tr>
<tr>
<td>22</td>
<td>Lecturers reluctance to adopt the use of ICT</td>
<td>3.9219</td>
<td>.84148</td>
<td>3.0049 .90811</td>
</tr>
<tr>
<td>23</td>
<td>Inadequate funding of ICTs in colleges of education</td>
<td>3.8125</td>
<td>.39340</td>
<td>3.3448 .63968</td>
</tr>
<tr>
<td>24</td>
<td>Government inability to support intensive use of e-learning network for teaching and learning</td>
<td>3.8125</td>
<td>.39340</td>
<td>3.2931 .69588</td>
</tr>
<tr>
<td>25</td>
<td>High cost of maintaining ICT infrastructures and ICTs</td>
<td>3.5938</td>
<td>.49501</td>
<td>3.2266 .76199</td>
</tr>
</tbody>
</table>

Source: Field work (2014).

The data presented in Table 3 shows that the respondents agreed on the ten (10) identified items as limitations to the effective application of ICT in the study area. The ten (10) items had means ranging from 3.2---3.9 with item 22(lecturers reluctance to adopt the use of ICT) having the highest mean of 3.9

DISCUSSION

Table I reveals that the application of ICT devices in agricultural production and marketing of farm yields has made remarkable progress in agricultural education in the colleges of education in South Eastern Nigeria in recent time. Today information concerning market situation, price situation, weather forecast, incidents of natural hazards (flood, pest and diseases outbreak) better marketing channels among others can be accessed and even disseminated to farmers through ICT. With ICT information on where and how to obtain improved varieties of planting material, improved animals breeds, better farm inputs and agricultural business contacts is easy and fast. ICT like radio, television, mobile phones, SMS, e-mail and computers has made great impact in spreading agricultural information. These findings are in line with the findings of Anonymous (2011) which noted that in Mauritian, mobile phones can be useful in marketing agricultural products, getting information on price of inputs, weather updates, diseases alert, crop and animal health/husbandry. In Nigeria, mobile phone, SMS, radio, telephone and television have made
remarkable impact in the field of agricultural production and marketing of farm yields in information dissemination.

The result in Table 2 shows that the ICT tools are useful and durable for record keeping. It further revealed essential areas in agricultural production and market of farm yields that deserve record keeping as far as agriculture is concerned, like parturition, stocking, administration of vaccines and drugs, farm inputs, harvest, sales and expenditure. This suggest that the respondents understood the importance of record keeping, and that good record keeping helps in the smooth running of institutions and farm businesses. These findings are in consonance with Okoh and Uko (2008) who stated that ICT inform of computer, mobile phone and laptop can be used to save record of crop and livestock yields. Uko and Okon (2008) also noted that record and record keeping are part of arteries that supply life sustaining blood to institutions and that it will be an impossible task to plan and administer any institution in which records are not kept or are carelessly or fraudulently kept.

The result as shown on Table 3 reveals that the 10 items identified were all limitations faced by the Colleges of Education regarding the effective application of ICT in agricultural education and production. Factors such as high cost of ICT, poor electricity supply, lack of well equipped ICT classroom, poor internet access, lecturers reluctance to adopt ICT, poor ICT knowledge and skills to mention a few are serious constraints to ICT application. These findings are in line with Adomi and Kpangban (2010) who catalogued the problems facing none implementation of ICT in schools as, lack of adequate ICT in school, high cost of ICT facilities, frequent electricity interruption and limited information infrastructure among others. These findings explains why Rogers (1995) reported that innovation adoption is a process whereby some people are more apt to adopt the innovation than others.

CONCLUSION AND RECOMMENDATIONS

The ICT requires skills, knowledge and capital investment. This in fact makes it hard for ICT to be quickly embraced fully in all areas of our living and working activities. However, if the Nigerian agricultural production sector must attain the great height hoped for, adequate use of ICT must be employed. This can be achieve if the colleges of education are well equipped with ICT and utilize them for agricultural instruction just like the advanced nations. They have achieved great height in agricultural education and production as a result of viable education, ICT application and ICT competent educators. This is necessary at the Colleges of Education level because these students are tomorrow farmers that will replace today’s farmers, and take Nigerian agricultural education and the production sector to the height yearning for. A thorough exposure of these students to the potentials of ICT by their lecturers will enable them actualize this dream. It therefore becomes necessary and an urgent matter for the government and all those in charge of managing this level of education to provide the necessary ICT facilities, needed ICT infrastructure and training of lecturers for the application of ICT in agricultural education. From the findings of this study the ICT literacy and level of application in agricultural education in general and agricultural production in particular in increasing. It is approximately above average, about 58%. However, the application of ICT at this level of education has impediments for its effective application, as high cost of ICTs, lack of ICT availability in school, electricity problems and lecturers reluctance to adopt ICT among others.

On the bases of the findings, the following recommendations were proffered.
1. Efforts should be made by government and all stakeholders in charge of this level of education to provide ICT and install the necessary ICT infrastructure.
2. Non Governmental Organization (NGOs), Associations, religious bodies, Age Grades and clubs should be more Philanthropic by supporting government by way of providing ICTs to Colleges of Education established in their states.
3. Government should provide ICT training program for all agricultural education lecturers in form of seminar, workshop and conference. In addition, the lecturers should make personal effort to become ICT literate.
4. Agricultural Extension workers should extend their agricultural extension programs to Department of Agricultural Education in Colleges of Education.
5. Government should ensure the provision of steady and stable electricity since ICT application depend solely on steady and regular power supply.
6. Agricultural students should endeavor to acquire ICT skills and knowledge for excellence in their chosen discipline and future career.

REFERENCES