

Assessment of Agricultural Science Teachers' Knowledge and Utilization of Information and Communication Technology in Nigerian Secondary Schools

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Abstract

The success of integrating information and communication technologies into the educational system depends largely on the skills and knowledge of teachers. The study examined the availability of information and communication technology in secondary schools, knowledge of information and communication technology possessed by agricultural science teachers, utilization of information and communication technology by agricultural science teachers for teaching-learning and the challenges posed by information and communication technology to agricultural science teachers. Four research questions were structured and two hypotheses were tested at 0.05 level of significance. A survey research design was adopted for the study. A total of 420 Agricultural science teachers were used to obtain information. A checklist and structured questionnaire with five points rating scale were used for data collection. The reliability coefficient of the instrument was established using Cronbach Alpha with a value of 0.83. Mean and Standard deviation were used for the data analysis. The results revealed that information and communication technology were not utilized for teaching-learning in secondary schools. It was recommended that training of agricultural science teacher should be reviewed to emphasize knowledge and skills related to the use of information and communication technologies for teaching and learning of agricultural sciences in secondary schools.

Keyword: information, communication, agricultural science teachers, secondary school

INTRODUCTION

Introducing technology into teaching and learning has been shown to make learning more student centered, encourage cooperative learning and stimulate increased teacher/student interaction. Positive changes in the learning environment brought about the information and communication. Technology occurs over a period of years as teachers become more experienced with technology. This new instructional technologies present vast new opportunities for schools to achieve the excellence and productivity they have long sought. To take advantage of these opportunities, however, educators and educationists would need to overhaul the entire school curriculum to render it relevant for the demands of the time (Long, 2005).

The success of educational innovations, according to Watson, (2001), depends largely on the skills and knowledge of teachers. Information and Communication Technology in education is relatively a new intervention in education, therefore, the teachers are more or less Co-learners alongside with students (Ater, Tiought & Nevkar, 2006). Dakich (2004), noted that the inclusion of information and communication technology in teaching by teachers who do not have certain characteristics necessary for an adequate teaching intervention, or

mastering the ICT may do more harm than good. Label and Hime, (2006) opined that the success of teaching with digital information technology would be difficult to achieve due to lack of deep knowledge of these technology by teacher. They further maintained that majority of teachers have no access to ICT facilities and even those who have access might not really get deep enough into the usage and dynamics of these technologies and fail to acquire the necessary knowledge to integrate the technologies into their teaching.

Papert (1995), and White (2005) maintained that information and communication technology have been infused into schools without fundamentally changing the way we learn and teach. Anderson and Becker (2001) and Watson (2001), supported this view by saying that in most cases, ICT were adopted to the traditional school structures, classroom organization and existing practices without first addressing comprehensive education reform. Cuban (2001) observed that technology itself will not revolutionize education. He identified the most significant barriers to successful integration and utilization of ICT and transformation of learning to be teacher's lack of confidence, experience and pedagogical understanding in mobilizing the potentials of digital technologies.

Abah (2006), remarked that even when teachers desire to use them, they are not well informed about what they are, where they can find them, or how they may be used for teaching and learning in their subject areas and may prefer the traditional chalk and board method. Andural and Ikyumen (2006) noted that most teachers do not only lack the skills of operating the computer, they in addition do not know what the computer technology provides to the world. In view of this, Kareem (2004), suggested that training should not be one-shot workshops, but rather ongoing experience so that teachers can be kept up-to-date with ever changing technologies. Aduwa and Iyamu (2004) in their assessment of the progress made by Nigeria and other African countries to institutionalize educational technology said that “though Nigeria has become aware of the invaluable role of ICT for effective teaching and learning, they have not been able to make significant progress in improving education through this medium.

Due to global implication related to this problem, empowering teachers with pertinent ICT skills and knowledge has become an important issue engaging various stake holders such as policy markers, researchers, and practitioners in the field of teaching and learning. This practically triggered the zeal of researchers to undertake this study.

MATERIALS AND METHODS

This study is a survey research and thus adopted survey design which uses sample data to get facts, views of people on the present status of a phenomenon being investigated. The study is carried out in Kogi State located in the southern Guinea savannah ecological zone of Nigeria. Opinions of 568 Agricultural Science Teachers in secondary schools in Kogi State constituted the population for the study (Kogi State Ministry of education, 2007) the sample size for the study was 420 comprising 210 junior secondary school Agricultural Science Teachers and 210 Senior Secondary School Agricultural Science teachers. This sample size was derived using proportionate stratified random sampling technique. The choice of this technique was appropriate because it allowed the sample to be drawn based on their proportions in all the zones, and also the two levels of Agricultural Education in secondary schools were taken care of, hence a total representative of all the attributes of the population. A structured questionnaire consisted of five sections was used. These sections include personal data of respondents, opinion of respondents on the availability of information and communication techniques, facilities for agricultural education programme, opinion on levels of knowledge of ICT for teaching, opinion on the extent of utilization of ICT for teaching agricultural science and opinion on the

challenges posed by ICT to agricultural science teachers in secondary schools. Check list and five points rating scale were utilized for collation of raw data. The instrument was validated by 7 experts in agricultural education and test and measurement. It was further subjected to trial-testing in order to establish its consistency and reliability coefficient with 30 agricultural science teachers in 15 secondary schools in Benue State. Opinions of these teachers were analyzed using Cronbach Alpha resulting to reliability coefficient of 0.83.

The researchers visited respondents at various schools with the approved structured questionnaire to ensure that the actual number of the population got exact number of questionnaire. The raw data collected for research questions through structured questionnaire was analysed using percentage, mean and standard deviation, while the two hypotheses were tested using- t-test at 0.05 level of significance. It was decided that for the research questions, any item with mean of 3.50 and above was considered as agreed, while any item with the mean of less than 3.50 was considered disagreed. For the hypotheses, if the t-calculated was more than the t-table, the null-hypotheses were accepted. Table 1-6 contained details of the findings (attached as appendix 1).

RESULTS AND DISCUSSION

The study found that majority of information and communication technology facilities were not available in secondary schools. This finding agrees with Watson (2001), Eriba and Adejoh (2004), who found that unavailability of computers has often been one of the most important obstacles to technology adoption and integration in Nigeria. The study found that except printers which were available in some secondary schools, other hardware peripherals such as scanners, plotters, camera etc were not available in most of the secondary schools. This finding does not deviate so much from earlier researchers. For instance, Aduwa and Iyamu (2004), disclosed that most of the schools that have computers also have printers, however, the availability of other types of hardware peripherals are quite limited.

The study found that Agricultural Science Teachers were not knowledgeable in the use of information and communication technology for teaching. This finding is in agreement with Lable and Hime (2006), Abah (2006), and Kareem (2004), who observed that the success of teaching with digital information technology would be difficult to achieve due to lack of deep knowledge of these technologies by the teachers. The study also showed that the level of utilization of information and communication technologies in secondary schools was very low. This finding differed from most studies particularly, those conducted in American and European

Schools with regard to the percentage of teachers using technology for teaching. This study however, supported the findings of Zidon and Luft (1986), and Lisham (2005) who found that most teachers perceived ICT to be effective for instruction but use them predominantly for purposes other than instruction. Teachers and students usually use them simply as electronic work books. Interactive, high performance uses of technology, such as networked team collaboration to solve real world problems, retrieving information from electronic libraries and performing scientific experiments in simulated environments are not practiced.

Information and communication technology poses a lot of challenges to Agricultural Science Teachers. These challenges include funding, procuring and repairing broken down computers and creation of content and stock of programmes to be used, change in the nature of teachers authority. This finding does not deviate from earlier researches. For instance, Ater, Tiough and Nevkar, (2006) identified the challenges to be; the challenge of creating learning and teaching environment that is fundamentally different from the one they themselves experienced, the challenge of appropriate pedagogy to the teacher, challenge of evaluation of learning outcomes through information technology. The study found that the cost of acquisition and maintenance of ICT equipment and accessories posed serious challenges to Agricultural Science Teachers. This supports the earlier findings of Andural and Ikyumen (2006), Leu and Kinzer (2000) who found that the Nigerian educational institutions are traditionally resource poor considering the current low levels of funding for education. With the present high cost, digital information technologies and the almost zero level of disposal personal income of education practitioners in Nigeria, one can only conclude that no matter how attractive the opinion of integrating modern digital information technology into traditional classroom environments might be, the prospects of such a scenario are indeed very dim.

CONCLUDING REMARKS

Understanding the pedagogical, psychological and cognitive barriers to the successful use of information and communication technologies is a vital pre-condition for improving the utilization of ICT in the educational process. It makes little sense to call on teachers to use new technologies to train their students when the teachers are trained using obsolete and outdated lecture-based instructional materials and methods. Therefore, the teacher has to learn how to use information and communication technologies applications, as well as employ techniques in creating and sustaining interest in

the students. Teaching and learning activities have to be organized to take up the opportunities, benefits and challenges of ICT. With a better knowledge of how these activities may be organized, teachers are more likely to take up the opportunities provided by ICT ensure effective teaching and learning. Therefore, teacher education in Nigeria should be reviewed to emphasize knowledge and skills related to information and communication technology use. Better skills, teacher training institutions in Nigeria should be provided with equipped modern instructional resource centres to facilitates teaching. In a nut-shell, curriculum planners should be fully engaged with the responsibility of reviewing the curriculum of agricultural science and other preferred courses to include new teaching and learning innovations and assessment techniques through ICT.

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APPENDIX 1

Table 1: Percentage Responses of Agricultural Science Teachers on the Availability of Information and Communication Technology in Secondary Schools.

S/N	Availability of ICT in Secondary Schools	Available	Percentage	Not Available	Percentage	Decision
1	Multimedia Computer System	282	67	138	33	Available
2	Computer Peripherals such as CD writers, printers, cameras etc	282	67	138	33	Available
3	Tutorial soft wares in agricultural science	10	2.00	410	98	Not available
4	Computer projectors	8	2.00	412	98	Not available
5	Drill and practice soft ware in agricultural science	20	5.00	400	95	Not available
6	Simulation and problem solving software in agricultural science	20	5.00	400	95	Not available
7	Power point facilities for seminars and workshop	10	2.4	410	98	Not available
8	Word processing soft ware for production of letters, memos etc	282	67	138	33	Available
9	Large screen TV and VCR player/recorder for practical illustration of some concepts	10	2.4	410	98	Not available
10	Internet facilities for sourcing information	10	2.4	410	98	Not available
11	E-mail soft ware for communicating peers and colleagues	10	2.4	400	98	Not available
12	Spreadsheet for solving some mathematical problems.	10	2.4	410	98	Not available

Table 2: Mean Scores of Agricultural Science Teachers on their Level of Knowledge of Information and Communication Technologies for Teaching and Learning

S/N	Knowledge of ICT for Teaching/Learning	N	X	SD	Remark
13	Professional judgment for the selection and application of common computer hardware including peripherals.	420	1.75	0.89	Not knowledgeable
14	Skills for the use and application of common computer software	420	2.32	1.08	Not quite knowledgeable
15	Management and application of ICT resources to create learner centered environments.	420	2.29	1.09	Not quit knowledgeable
16	Selection and application of appropriate hardware to suit the needs of the learners and the context of teaching	420	2.37	1.24	Not quit knowledgeable
17	Visualization, animation and simulation packages in ICT which facilities understanding of concepts by students	420	2.94	1.21	Not quit knowledgeable
18	Designing the ICT pedagogical strategies and practices that support the diverse needs of the learner	420	2.52	1.15	Not quit knowledgeable
19	Application of ICT enriched curricular activities to facilitate enquiry, problem solving, critical thinking and knowledge construction	420	2.62	1.08	Not quit knowledgeable
20	Use of ICT for the implementation of a variety of monitoring, assessment and evaluation strategies	420	2.62	1.11	Not quit knowledgeable
21	ICT safe learning environment that complies with basic ergonomic and healthy principles.	420	2.48	1.12	Not quit knowledgeable
22	Network resources such as the internet and local area networks to communicate, conduct research and exchange ideas.	420	2.32	1.11	Not quit knowledgeable
23	Planning lessons with correct organization of ICT resources	420	2.38	1.11	Not quit knowledgeable
24	using technology to design and present units of work	420	2.52	1.16	Not quit knowledgeable
25	ICT for teaching higher order cognitive skills	420	2..32	1.08	Not quit knowledgeable

Table 3: Responses According to Utilization of ICT for the Teaching/Learning in Secondary Schools

S/N	Knowledge of ICT for Teaching/Learning	N	X	SD	Remark
26	Complete multimedia computer system	420	3.00	1.28	Utilize
27	Computer peripherals such as CD writers, printer camera etc	420	3.00	1.28	Utilize
28	Tutorial software in agricultural science	420	2.14	1.10	Not Utilize
29	Computer projectors for lessons and making presentations	420	2.09	1.09	Not Utilize
30	Drill and practice software in agricultural science	420	2.00	1.03	Not Utilize
31	Simulation and problem solving software in agricultural science	420	2.10	1.03	Not Utilize
32	Power point software for making workshop, seminar and conference presentations	420	2.10	1.12	Not Utilize
33	Word processing software for production of letters, memos etc	420	3.00	1.28	Not Utilize
34	Large screen TV and VCR player/recorder for practical illustration of some concepts	420	1.92	0.93	Not Utilize
35	Database management software for aiding management decisions	420	3.00	1.28	Utilize
36	Satellite facilities to become members of extended learning family	420	2.10	1.12	Not Utilize
37	Internet facilities for sourcing information	420	2.03	0.98	Not Utilize
38	E-mail software for communicating peers and colleagues	420	1.96	1.05	Not Utilize
39	Spreadsheet software for solving some mathematical and graphical problems	420	2.09	1.09	Not Utilize

Table 4: Responses According to the Challenges ICT Posed to Agricultural Science Teachers in the Secondary Schools.

S/N	Knowledge of ICT for Teaching/Learning	N	X	SD	Remark
40	Up to date understanding of ICT used in home, school, work place and community	420	3.48	1.29	Challenging
41	Modernizing Agricultural Science curriculum to facilitate the integration of ICT in secondary schools.	420	4.03	1.00	Highly Challenging
42	Cost of acquisition of ICT equipment and accessories	420	4.01	1.01	Highly Challenging
43	Cost of maintenance of ICT equipment	420	4.02	0.99	Highly Challenging
44	Cost of hardware replacement or upgrading	420	4.02	1.00	Highly Challenging
45	Configuring physical structures and facilities to accommodate modern digital information technologies	420	4.03	.99	Highly Challenging
46	Absence of computer technicians in the schools to repair broken down computers	420	4.02	1.01	Highly Challenging
47	Creating learner-centered environment and assuming the role of a facilitator.	420	4.03	0.99	Highly Challenging
48	Integrating ICT into a range of learning activities to facilitate both individual and collaboration work.	420	4.03	0.99	Highly Challenging
49	Encouraging students to become members of local and extended community of learning	420	4.00	0.98	Highly Challenging
50	Ensuring that students develop competence, confidence, and critical awareness in using ICT.	420	4.00	0.99	Highly Challenging
51	Developing a personal plan for continuous professional learning related to ICT pedagogies.	420	4.00	0.99	Highly Challenging
52	Using ICT for research work.	420	4.00	1.00	Highly Challenging

Table 5: t-Test of difference between the mean responses of Junior Secondary School Agricultural Science Teachers and the Senior Secondary School Agricultural Science Teachers.

Group	N	X	S.D	t-cal	t-critical	Remark
JSS Agricultural Science Teachers	210	2.98	0.21			
				2.52	1.645	Significant
SSS Agricultural Science Teachers	210	2.35	0.25			

Table 6: T-Test of Difference Between the mean Responses of Junior and Senior Secondary Agricultural Science Teachers

GROUP	N	X	S.D	t-cal	t-critical	Remark
JSS Agricultural Science Teachers	210	4.01	0.1			
				1.07	1.645	Not Significant
SSS Agricultural Science Teachers	210	3.95	0.14			