COMPUTER-MEDIATED COMMUNICATION AND STUDENTS' INTEREST AND ACHIEVEMENT IN SENIOR SECONDARY AGRICULTURAL SCIENCE CONCEPTS IN UMUAHIA EDUCATION ZONE OF ABIA STATE

[1]UROKO, J. E. & [2]UKAH, G. N.
[2&2]Department of Educational Psychology and Counselling
Michael Okpara University of Agriculture
Umudike, Abia State
ejikejonas23@gmail.com

Abstract
This study was carried out to investigate the effect of computer-mediated communication learning (CMCL) strategy on the interest and achievement in Agricultural Science concepts of senior secondary school students. Two research questions were generated and two null hypotheses were formulated to guide the study. The study was a non-equivalent control group quasi-experimental design, involving one treatment and one control group. A total of 48 senior secondary class two students in two co-educational senior secondary schools drawn from a population of 1227 senior secondary school class two students in Umuahia Education Zone of Abia State, Nigeria made up the sample for the study. In each school, one intact class was randomly selected and the intact classes were also randomly assigned to experimental and control conditions. Two instruments named Agricultural Science Concepts Interest Rating Scale (ASCIRS) and Agricultural Science Concepts Achievement Test (ASCAT) were developed by the researcher. The internal consistency reliability of the ASCIRS and ASCAT was determined using Cronbach Alpha procedure and reliability estimates of 0.78 and 0.79 were obtained. The computer-mediated communication learning (CMCL) strategy lesson plan was used for the experimental group while the control group received training using the conventional teaching method. The data obtained were analyzed using mean scores, standard deviation and 2 x 2 Analysis of Covariance (ANCOVA). The major findings of the study were that intervention using computer-mediated communication learning (CMCL) strategy significantly improved the interest and achievement in Agricultural Science Concepts of senior secondary school students. It was thus recommended that emphasis should be given to equipping students with the relevant skills in using computer-mediated communication learning (CMCL) strategy.

Key: Computer-mediated communication learning (CMCL) strategy, Interest, Achievement.

Introduction

Agriculture may be defined as the art and science of growing plants and other crops and raising of animals for food, other human needs or economics gains.

Marques and Albuquerque (2012) stated that agriculture is derived from the Latin word "Agar" meaning field and "culture"; meaning growing or cultivation. Rimando (2014) in his definition of agriculture, states that agriculture is the systematic raising of useful plants and livestock under the management of man. Therefore, agriculture could be defined as the practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool and other products. It involves the following activities: cultivation of the land for the production of crops, rearing of farm animals for the production of food and raw materials, partial processing of farm products, preservation and storage of farm products and marketing of farm products

The importance of agriculture and agricultural science to individuals and national development at large cannot be over emphasized. In Nigeria, Agriculture is the main employer of labour. It employers about sixty to seventy per cent (60% to 70%) of Nigerian labour force (Odior, 2014). Agriculture provides food for ever increasing population of Nigeria. The bulk of raw materials used in the agro-based industries such as textiles; cigarettes industries among others come from agriculture. It is also an important source of income for most Nigerian farmers especially those from the rural areas. Agriculture is important source of foreign exchange earnings for the country. Agriculture serves as a source of market for some industrial products such as fertilizers, tractors, insecticides and pesticides etc. In summary, agriculture is a crucial sector for reducing poverty and attaining the millennium development Goals (MDG'S) which includes reduction of the percentage of people in extreme poverty and hunger (Odior, 2014)

In spite of the importance of agricultural science in the overall economic development of the country, students' achievements in it have been very unsatisfactory (WAEC, 2017-2020). The government, in synergy with stakeholders in the education, tried to devise means to reach youths and children for re-orientation of value system and means of livelihood to this effect and there was sudden enhanced interest of the government in repositioning and learning of agricultural science in secondary school in Nigeria (Egbule, 2014). Agricultural science has been inducted as one of the core vocational curricular subjects in secondary schools. It is also a compulsory subject in junior secondary schools in Nigeria as indicated by the Federal Government of Nigeria and the National Policy on Education (FRN 2013). The Agricultural science curricular emphasizes on learner centered method of teaching to facilitate students' mastery of the subject and to enable students to utilize learnt skills in solving their everyday problem using their own initiatives. Despite these measures, agricultural science taught at secondary school level has not been able to successfully improve students' interest and achievement.

Computer-mediated communication is one of the promising innovations to improve teaching and learning with the help of modern information and technology (Allen & Seaman, 2018). Computer-mediated communication learning (CMLC) strategy has the potentials to shift focus from teacher-centred to student-centred education. CMLC uses collaborative software tools e.g. e-mail board, usenet,

Listserve, chats, net conferencing, bulletin board, cell phones for collaboration and communication in the student-teacher and student-student interaction (Mizell, 2014). With e-learning, the focus is no longer on teacher, but both the teacher and student especially who take advantage of technology to varied resources of knowledge made available by existing technology. E-learning makes learning self-paced for students and put the student on the driving seat on the 'highway' of learning (Brown, Anderson & Murray, 2017). Though computer-mediated communication (CMC) learning strategy has some research evidence in support of its potential effectiveness in some western countries (Sivasubramaniam, 2010; Allen & Seaman, 2018), little studies seem to be available here in Nigeria on its effectiveness.

The problem of the study stated in a question form is: What is the effect of computer-mediated communication learning (CMCL) strategy on the interest and achievement in Agricultural Science concepts of senior secondary school students?

Specifically, the study sought to:

1. determine the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the interest mean scores in Agricultural Science concepts of students.
2. find out the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the achievement mean scores in Agricultural Science concepts of students

Research Questions

1. What are the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the interest mean scores in Agricultural Science concepts of students.
2. What are the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the achievement mean scores in Agricultural Science concepts of students

Research Hypotheses

1. there is no significant difference in interest mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method
2. there is no significant difference in the achievement mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method

Methodology

The study adopted a non-equivalent control group quasi-experimental design, involving one treatment and one control group. A total of 48 senior secondary class two students in two co-educational senior secondary schools were drawn from a

population of 1227 senior secondary class two students in Umuahia Education Zone of Abia State, Nigeria made up the sample for the study. In each school, one intact class was randomly selected and the intact classes were also randomly assigned to experimental and control conditions. Two instruments named Agricultural Science Concepts Interest Rating Scale (ASCIRS) and Agricultural Science Concepts Achievement Test (ASCAT) were developed by the researcher. The Agricultural Science Concepts Interest Rating Scale is 24-item questionnaire aimed at finding out the interest of the respondents in Agricultural Science concepts. The ASCIRS is a four point rating scale with response options ranging from: Strongly Agree (SA-4) Agree (A-3) Disagree (D-2) to Strongly Disagree (SD-1). The students were asked to indicate their degree of interest by taking- a number from 1 to 4 against any of the above stated options of response ratings. The ASCAT contains 50 multiple test questions on Agricultural Science concepts selected from Senior Secondary School Agricultural Science. The ASCAT is a five point rating scale with response options ranging from: A to E. The internal consistency reliability of the ASCIRS and ASCAT was calculated using Cronbach Alpha procedure and reliability estimates of 0.78 and 0.79 were obtained. The computer-mediated communication learning (CMCL) strategy lesson plan was used for the experimental group while the control group received training using the conventional teaching method. The content scope of Agricultural Science Concepts taught was Soil science. The researcher's choice of soil science for the study was informed by the fact that the area has always been identified as one of the candidates' areas of weakness in WAEC examination in Nigeria especially because of the chemical computations involved (WAEC Chief Examiner's report, 2017-2020). The data obtained were analyzed using mean scores, standard deviation and 2 x 2 analysis of covariance (ANCOVA).

Results

Research Question One: What are the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the interest mean scores in Agricultural Science concepts of students.

Table 1: Pre-test - Posttest Mean Scores in Interest in Agricultural Science Concepts of Students Exposed to Computer-Mediated Communication Learning (CMCL) Strategy and the Control Group

Treatment Group		Pre-Test	Post Test	Mean Diff
Experimental group	Mean	35.51	62.51	27.00
		24		
	N	8.90	24	
	SD		18.31	
Control group	Mean	36.80	38.26	1.46
	N	24	24	
	SD	9.09	9.56	

Data in Table 1 showed the mean scores difference in the Agricultural Science concepts interest of students exposed to Computer Mediated Communication Learning (CMCL) strategy and the control group. From the data, one can see that the subjects in the experimental group had a pretest mean score of 35.51 and standard deviation of 8.90 in their Agricultural Science Concepts Interest Scale; while the post-test mean Agricultural Science concepts interest score was 62.51 with a standard deviation of 18.31; giving a mean pre-test/post-test difference score of 27.00. The subjects that were treated with conventional teaching strategy (control group) had a pretest mean Agricultural Science concepts interest score of 36.80 with a standard deviation of 9.09 while the post-test mean score was 38.26 with a standard deviation of 9.56. This gave a prêt-test/posttest mean difference score of 1.46. The standard deviation of each group from the mean ranged from 8.90 – 18.31; indicating that respondents were not too far from the mean and from one another in their responses, adding further validity to the mean. The experimental group that was exposed to Computer Mediated Learning Communication (CMCL) strategy had a higher mean Agricultural Science concepts interest score than the subjects in the control group.
The research question was further subjected to inferential testing.

Hypothesis One: There is no significant difference in the interest mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method

Table 2: Summary of the 2-Way Analysis of Covariance of Interest in Agricultural Science Concepts of Students Exposed to Computer-Mediated Communication Learning (CMCL) Strategy and the Control Group

Source	Type III sum of squares	Df	Mean square	F	Sig
Corrected model	237.666[a]	2	237.666[a]	1.227	.000
Intercept	598.870	1	598.870	12.367	.000
Pre-Int	18.082	1	18.082	.373	.544
Treatment	220.787	1	220.787	4.559	.000
Error	2082.251	45	48.424		
Total	31822.000	48			
48.424	2319.917	2319.917			

a. R Square = .102 (Adjusted R Square = .019).

The data in the Table 2 above showed that Computer Mediated Communication Learning (CMCL) strategy as a factor in the study had a significant effect on Agricultural Science concepts interest mean scores of the subjects. The calculated f-value of 4.559 which is has a probability value of 0.000 as shown in the table is less

than 0.05 level. Therefore, the null hypothesis of no significant difference in the interest mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method was rejected. Consequently, there was significant difference in the interest mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method.

Research Question Two: What are the differential effects of computer-mediated communication learning (CMCL) strategy and conventional teaching method on the achievement mean scores in Agricultural Science concepts of students

Table 3: Pretest-Posttest Mean Scores in Achievement in Agricultural Science Concepts of Students Exposed to Computer-Mediated Communication Learning (CMCL) Strategy and the Control Group

Treatment Group		Pre-Test	Post Test	Mean Diff.
Experimental group	Mean	40.10	64.23	24.13
	N	24	24	
	SD	14.60	17.30	
Control group	Mean	41.17	42.44	1.27
	N	24	24	
	SD	15.75	16.31	

Data in Table 3 showed the mean scores difference in the Agricultural Science concepts achievement of students exposed to Computer Mediated Communication Learning (CMCL) strategy and the control group. From the data, one can see that the subjects in the experimental group had a pre-test mean score of 40.10 and standard deviation of 14.60 in their Agricultural Science Concepts Achievement Test; while their post-test mean Agricultural Science concepts achievement score was 64.23 with a standard deviation of 17.30; giving a mean pre-test/post-test difference score of 24.13. The subjects that were treated with conventional teaching strategy (control group) had a pre-test mean Agricultural Science concepts achievement score of 41.17 with a standard deviation of 15.75 while their post-test mean score was 42.44 with a standard deviation of 16.31. This gave a prêt-test/post-test mean difference score of 1.27. The standard deviation of each group from the mean ranged from 14.06 – 17.30; indicating that respondents were not too far from the mean and from one another in their responses, adding further validity to the mean. The experimental group that was exposed to Computer Mediated Communication Learning (CMCL) strategy had a higher mean Agricultural Science concepts achievement score than the subjects in the control group.
The research question was further subjected to inferential testing.

Hypothesis Two: There is no significant difference in the achievement mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) and those taught using conventional teaching method.

Table 4: Summary of the 2-Way Analysis of Covariance of Achievement in Agricultural Science Concepts of Students Exposed to Computer-Mediated Communication Learning (CMCL) Strategy and the Control Group

Source	Type III sum of squares	Df	Mean square	F	Sig
Corrected model	358.827[a]	2	358.827[a]	1.790	.000
Intercept	283.277	1	283.277	5.653	.000
Pre-Achiev	10.598	1	10.598	.211	.648
Treatment	183.760	1	183.760	3.667	.000
Error	2154.652	45	50.108		
Total	31571.000	48			
Corrected Total	2513.479	47			

a. R Square = .143 (Adjusted R Square = .063).

The data in the Table 4 above showed that Computer Mediated Communication Learning (CMCL) strategy as a factor in the study had a significant effect on Agricultural Science concepts achievement mean scores of the subjects. The calculated f-value of 3.667 which is has a probability value of 0.000 as shown in the table is less than 0.05 level. Therefore, the null hypothesis of no significant difference in the achievement mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method was rejected. Consequently, there was significant difference in the achievement mean scores in Agricultural Science concepts of students who were exposed to computer-mediated communication learning (CMCL) strategy and those taught using conventional teaching method.

Discussion of Findings

The findings of the study indicated that training in the use of computer-mediated communication learning (CMCL) strategy significantly improved the interest in Agricultural Science concepts of senior secondary school students. The students exposed to computer-mediated communication learning (CMCL) strategy demonstrated significantly greater interest than those in the control group who were taught using conventional teaching method in Agricultural Science concepts. The result is in line with the findings of Sivasubramaniam (2010) and Allen and Seaman (2018), who found significant improvement in the interest of subjects after being exposed to computer-mediated communication. A possible explanation for the

superior improvement in interest recorded by the treatment group in the study could be the active involvement of students in the process of learning using computer-mediated communication learning strateg.

The findings of the study also indicated that training in the use of computer-mediated communication learning (CMCL) strategy significantly improved the achievement in Agricultural Science concepts of senior secondary school students. The students exposed to computer-mediated communication learning (CMCL) strategy demonstrated significantly greater achievement than those in the control group who were taught using conventional teaching method in Agricultural Science concepts. The result differs from the study of John (2013) who reported that computer-mediated communication strategy appeared to have at best inconsistent effects in achievements, possibly because of the newness effect of the technology in most developing countries. A situation that permitted the active involvement of students in the process of learning as computer-mediated communication learning strategy did in the present study is a possible explanation for the superior improvement in achievement recorded by the treatment group.

Conclusion

From the findings of the study and the discussion that followed, the following conclusions could be made.

Intervention using computer-mediated communication (CMC) learning strategy significantly improves the interest and achievement of students in Agricultural Science concepts. The students exposed to computer-mediated communication learning strategy demonstrated significantly greater interest and achievement than those in the control group who were taught using conventional teaching method; indicating the effectiveness of computer-mediated communication learning strategy.

Educational Implications of the findings

The fact that training in computer-mediated communication learning strategy improves the interest and achievement in Agricultural Science concepts suggests that teachers would achieve better results if trained on how to teach using computer-mediated communication learning strategy. Experience has shown that teachers during their preparatory stage are not exposed to the skills required in using computer-mediated communication learning (CMCL) strategy and how to plan CMCL strategy intervention.

Recommendations

Based on the findings of the study and their educational implications, the following recommendations were made:

1. As the results of the study indicated that training in computer-mediated communication learning strategy is effective in enhancing students' interest and achievement in Agricultural Science concepts, the State Ministries of Education should adopt computer-mediated communication learning strategy and emphasis

should be given to equipping students with the relevant skills in using computer-mediated communication learning strategy.

2. Teacher preparation institutions should incorporate computer-mediated communication learning strategy in the relevant curriculum units and expose both the pre-service and in-service teachers to this strategy learning. The meaningfulness of the application of e-learning in the implementation of collaborative learning can be distilled from Akudolu (2014:197) when she maintained that "technological integration of curriculum refers to the use of technological knowledge and devices to integrate all aspects of the curriculum to life activities".
3. It is however instructive that computer-mediated communication learning packaged instruction be disseminated. However, the e-learning must take cognizance of learners' development, interest, attitude, cognitive ability and the planning of instruction has to reinforce and motivate learning independent of the teacher.

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