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Original Research Article

Effect of computer assisted teaching strategy on student's motivation to learn agriculture in secondary schools in Kenya

Joyline Mugero Muchiri[1], Hillary K. Barchok[1] and Kathuri Nephat J.[2]

[1]Faculty of Education, Chuka University, P.O Box 109- 60400

[2]Faculty of Education, Kenya Methodist University, P. O. Box 267-60200, Meru

***Corresponding Author's Email: raphael.mwiti@yahoo.com**

Abstract

Agriculture is taught in Kenyan secondary schools to ensure that students are exposed to basic principles necessary for agricultural production in the country. Taking into account that agriculture is the backbone of Kenya's economy; students should develop motivation to learn the subject. The purpose of this study was to investigate the effect of Computer Assisted (CAT) strategy on students' motivation to learn agriculture. The study employed Solomon Four-Quasi-experimental design. Target population was the 1,779, 876 secondary school students in Kenya. The study was conducted in eight county secondary schools in Tharaka Nithi County, Kenya. Stratified random sampling technique was used in selecting participating schools. A sample of 327 Form One students participated in the study. The research instrument was Motivation Towards Agriculture (MTA) questionnaire with a reliability coefficient of 0.78. Analysis of Variance (ANOVA) was used in data analysis. Statistical significant values were accepted at α level of 0.05. The findings indicated that CAT strategy enhanced motivation to learn agriculture. The study concluded that CAT is an effective strategy in enhancing motivation to learn agriculture and therefore agriculture teachers should be encouraged to incorporate CAT strategy in their teaching.

Keywords: Agriculture Subject, Computer Assisted Teaching, Conventional Teaching, Motivation

INTRODUCTION

Agriculture is one of the subjects offered in Kenyan secondary schools and at primary level it is integrated in the science subject (Mwiria, 2002; Ngugi, Isinika, Temu and Kitalyi, 2002). At the secondary school level, it is an optional subject right from form one. However, those who choose it in form one have an opportunity of dropping it in form three (KIE, 2002). The aim of teaching agriculture in secondary schools is to ensure that learners are exposed to basic principles necessary for agricultural production in the country. The teaching of agriculture is expected to promote the acquisition of skills for self reliance in agriculture (Mwiria, 2002). Learners are exposed and involved in various practical activities that will enable them develop the necessary skills and abilities required in agricultural production (KIE, 2006). Taking into account that agriculture is the backbone of Kenya' economy, as many students as possible should be encouraged to study the subject.

Success of a subject is normally reflected by the number of students opting to study it (Tanui et al., 2008). Being an elective subject, the development of agriculture in secondary schools depends very much on the number of students studying it in secondary schools. The percentage of students taking agriculture in secondary schools in Kenya, however has been on decline for the years, 2008-2013 (KNEC, 2014). For the year 2013, only

40% of the total number of students enrolled for agriculture at KCSE level. This low enrolment can partly be attributed to the students' low motivation to learn the subject. Interest plays a central role in motivation (Deci& Ryan, 2002). Interest in the subject matter is one of the factors influencing enrolment in agriculture (Calvin, 1986).

Low motivation is partly as a result of the teaching strategies employed by the teacher. According to Weller, (2005), motivation to learn is enhanced by the way in which instructional material is organized. Most of the teaching strategies practiced by agriculture teachers are expository and facts oriented, assigning the learners a passive role (Kathuri, 1990; Ngesa, 2006). Teachers usually act as the dispensers of knowledge while learners listen and take notes. Since motivation is necessary in learning, strategies that enhance motivation should be adopted in teaching agriculture. Zahorik (1996) argues that the key to maintain motivation is involvement. Therefore, agriculture teachers should employ those strategies that make learners active in the teaching learning process, like the Computer Assisted Teaching (CAT) strategy.

Computer assisted teaching strategy involves the use of computers in the learning process. Learners are actively involved in the learning process and this increases motivation to learn. The novelty of computers arouses enthusiasm among learners and motivates them to learn (Meena, 2008). Use of computers has been shown to produce positive results in teaching difficult topics or where motivation is low in different subjects (Tanui et al., 2008; Kiboss et al., 2004). Despite the effectiveness of computers in enhancing motivation in learning, research on this area in relation to secondary school agriculture is limited. In an attempt to fill this gap, the present study investigated the effect of computer assisted teaching strategy on students' motivation to learn agriculture.

Study Objective

Overall aim of the study was to determine the effect of computer assisted teaching strategy on students' motivation to learn agriculture. Its specific objective was to determine whether there is a difference in motivation to learn agriculture between students exposed to CAT strategy and those exposed to Conventional Teaching (CT) strategy.

METHODS AND MATERIALS

Research Design

The study used quasi-experimental research design and in particular Solomon Four Group design. Quasi-experimental design uses natural assembled groups such as classes in research. The design allows the researcher to randomly select a sample from the population without the random assignment of individual cases to comparison groups. According to Ogunniyi (1992), Solomon Four-Group design is the most rigorous design that can be used in quantitative studies since it uses two control groups in comparison to other experimental designs. Solomon Four-Group design is as follows:

Group I (E1)	O_1	X	O_2
Group II (C1)	O_3		O_4
Group III (E2)	X		O_5
Group IV (C2)	O_6		

Key: O_1 and O_3 are pretests; O_2, O_4,O_5 and O_6 are posttests; X is the treatment.

Group I was the experimental group (E1) which received the pretest (O_1), the treatment (X) and the posttest (O_2). Group II was the control group (C1) which received a pretest (O_3), no treatment and the posttest (O_4). Group III was another experimental group (E2) which received treatment (X) and the posttest (O_5) but did not receive the pretest. Group IV was another control (C2) that received the posttest (O_6) only. Group 1 and III were exposed to CAT strategy. Group II and Group IV were taught agriculture using the conventional teaching strategy.

The design controls major threats to internal validity except those associated with interaction of: maturity and history, selection and maturation and selection and instrumentation (Cook and Campbell, 1979). Random assignment of schools to experimental and control groups controlled selection and maturation. To control interaction between selection and instrumentation, the conditions under which the instruments were administered were kept as similar as possible across the schools.

Data Collection and Analysis

The target population for the study was the 1,779, 876 students in secondary schools in Kenya. The study was carried out in Tharaka Nithi County, Kenya. The county has a total of 136 secondary schools comprising of 2 national, 14 extra-county, 29 county and 91 sub-county secondary schools. County secondary schools in possession of computers for teaching purposes were considered for this study. The accessible population was the 8,140 form one students in secondary schools in the county. Form ones were selected because the topic on Livestock Production I (Common livestock breeds) is taught at this level (KIE, 2006).

Stratified random sampling technique was used to select 4 girls' and 4 boys' secondary schools. A total of 163 boys and 164 girls participated in the study. Simple random sampling technique was used to select a particular stream for data analysis in cases where there

Table 1. Pretest Mean Scores on Motivation to Learn Agriculture

Group	N	Mean	Standard Deviation
E1	82	3.83	0.49
C1	83	3.75	0.65

Table 2. The t-test of Pretest Scores on Motivation to Learn Agriculture

	t	df	Sig. (2-tailed)
Equal variances assumed	.864	163	.389
Equal variances not assumed	.864	150.505	.389

was more than one stream in a participating school. However, for schools in the experimental groups, treatment was administered to all the streams.

Data was collected by a Motivation towards Agriculture (MTA) questionnaire. Items on motivation were adopted from the scale developed by Vallerand, Petelleir, Blais, Bere, Senecal and Vallieres (1992) on measurement of intrinsic academic motivation. These items were slightly modified to suit agriculture. The MTA questionnaire had 34 items based on a 5 point Likert scale where students were required to state whether they Strongly Agree(SA), Agree(A), Undecided(U), Disagree(D) or Strongly Disagree(SD) with the given statements. To ascertain the reliability of the questionnaire, a pilot study was carried out in a school in the neighbouring Embu County. Cronbach's Coefficient alpha was used to estimate reliability of the MTA. A reliability coefficient of 0.7 and above was accepted. The MTA yielded a coefficient of 0.78, hence was suitable for the study.

Form one agriculture teachers in the experimental groups were trained for one day on the use of CAT strategy in teaching. Teachers in the experimental groups taught agriculture by use CAT strategy while their counterparts in the control groups taught agriculture by use of Conventional Teaching (CT) strategy. The topic of instruction was Livestock Production I (Common livestock breeds). All the teachers in the sampled schools used a common implementation schedule which was prepared by the researcher. Before commencement of the study, groups I and II were given a pretest. This was followed by a three weeks intervention of the CAT strategy for groups I and III. After the intervention, MTA was administered to all the groups. Students' pretest and posttest responses were scored to generate data for analysis. Data was analysed using descriptive and inferential statistics.

RESULTS AND DISCUSSIONS

Pretest Results on Motivation to Learn Agriculture

In order to assess the level of motivation to learn agriculture before exposure to CAT strategy, pretest mean scores on motivation towards agriculture were analyzed. Each item in the MTA questionnaire was rated on a five point Likert scale ranging from:

Strongly Agree (SA) = 5, Agree (A)=4, Undecided (U)=3, Disagree (D)=2 and Strongly Disagree (SD)=1.Negatively stated items were scored in the reverse order. The mean rating score for all the responses was used to calculate the mean score for a particular group. Results in Table 1 show the pretest mean scores on motivation to learn agriculture.

Results in Table 1 show that the mean score for experimental group E1 and control group C1 were 3.83 and 3.75, respectively. An independent t-test was performed to find out whether the mean scores were significantly different. Results are presented in Table 2.

Results presented in Table 2 show no significant difference on motivation to learn agriculture for the two groups, $t(163)=0.864$, $p>0.05$). The p (.389) is greater than 0.05 so the difference is not significant. The pretest mean scores for the experimental group E1 and control group C1 were equivalent. Therefore, the level of motivation to learn agriculture prior to the administration of CAT strategy were similar for experimental and control groups. The two groups were equivalent, hence, suitable for the study.

Posttest Results on Motivation to Learn Agriculture

In order to determine the effect of CAT strategy on motivation to learn agriculture an analysis of posttest scores in MTA were carried out. Figure 1 shows the posttest means scores on Motivation to learn agriculture.

Results in Figure 1 show that the mean score for experimental group E1 was the highest, 4.11, followed by group C2 with a mean of 4.00. Experimental group E2 had a mean of 3.93 and lastly control group C1 had a mean score of 3.47. To determine whether the means on motivation to learn agriculture were significantly different for the four groups, one way Analysis of Variance (ANOVA) was carried out. Results are presented in Table 3.

Results in Table 3 show that there was a significant difference between the means of the four groups, $F(3,323)=27.348$, $P<0.05$. The p(.000) is less than 0.05 so the difference is significant. This implies that there was

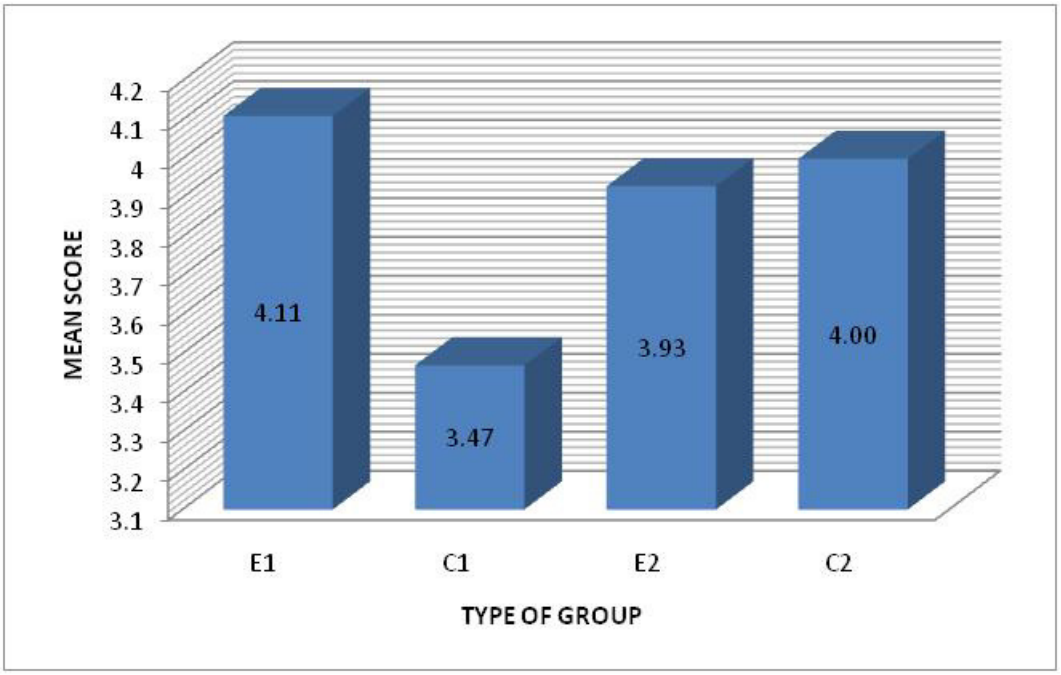

Figure 1. Posttest Mean Scores on Motivation to Learn Agriculture

Table 3. Analysis of Variance (ANOVA) of the Posttest Mean Scores on Motivation to Learn Agriculture

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.992	3	6.664	27.348	.000
Within Groups	78.704	323	.244		
Total	98.695	326			

Table 4. Comparisons of Posttest Mean Scores on Motivation to Learn Agriculture

(I) type of group	(J) type of group	Mean Difference (I-J)	Std. Error	Sig.
E1	C1	.64593(*)	.07686	.000
	E2	.18322	.07733	.110
	C2	.11168	.07733	.898
C1	E1	-.64593(*)	.07686	.000
	E2	-.46271(*)	.07710	.000
	C2	-.53425(*)	.07710	.000
E2	E1	-.18322	.07733	.110
	C1	.46271(*)	.07710	.000
	C2	-.07154	.07757	1.000
C2	E1	-.11168	.07733	.898
	C1	.53425(*)	.07710	.000
	E2	.07154	.07757	1.000

*The mean difference is significant at the .05 level.

a significant difference on motivation to learn agriculture for the four groups after exposure to CAT strategy. To investigate which groups significantly differed, *Bonferroni post hoc* test of multiple comparisons was carried out. Results of the test are presented in Table 4.

Results in Table 4 show that the mean difference of groups E1 versus C1, and C1 versus E2 were significant at 0.05 level. The significant level of E1 versus C1, and C1 versus E2 is .000 which is less than 0.05, so there is a difference in the mean scores of experimental and control groups. This difference could be attributed to the treatment. This suggests that CAT strategy improved students' motivation to learn agriculture. This led to the rejection of the null hypotheses ($H_0$1), which stated that

there is no statistically significant difference in motivation to learn agriculture between students exposed to CAT strategy and those exposed to CT strategy. This implies that CAT strategy is more effective than CT strategy in enhancing students' motivation to learn agriculture.

Findings of the present study are consistent with the findings of Tanui, Kiboss and Nassiuma (2008) on the effect of Computer Based Instruction (CBI), on students' achievement and motivation in secondary school business education in Kenya. The study showed that students in the experimental group had higher rating of the nature of their double entry account course in business studies than students in the control group. A study conducted by Odera (2011) showed that use of media technology tools such as computers motivates students to learn various subjects effectively. This is achieved by making students search for information from the computer .Teachers in the study indicated that the use of computers increased their students desire to learn.

Fedisson and Bradic (2007) carried out a study on the effect of teaching with computer as a technology tool on motivation and achievement. Findings of the study revealed that students who were taught by use of computers had higher motivation to learn than their counterparts who were exposed to traditional methods of teaching. In another study, Shroff and Vogel (2009) investigated the difference in university students' motivation to learn when exposed to computers and conventional teaching methods. Results of the study showed that motivation was higher for students exposed to computers than their counterparts exposed to conventional teaching.

Findings of the present study concur with Gabrielle (2010) on the effects of computer-mediated instructional strategies on motivation, performance and self-directed learning. The study showed a significant difference in motivation to learn among students who accessed the computer-mediated instructional strategies compared to students who had no access to computer-mediated strategies. Several other studies have shown that the use of computers in the classroom is effective in enhancing students' motivation to learn (Barak et al., 2006; Mackinnon and Vibert, 2002; Mistler-Jackson and Songer, 2002; Trimmel and Bachmann, 2004).

CONCLUSION AND RECOMMENDATION

Findings of the study demonstrated that CAT strategy enhances motivation to learn agriculture better than the conventional teaching strategy. Therefore students benefit more in terms of motivation to learn agriculture when exposed to CAT strategy than the CT strategy. This is because unlike the CT strategy, CAT strategy made learning interesting by promoting learner centred approach in the teaching learning process. Computer assisted teaching aroused enthusiasm among the students and motivated them to learn agriculture. The study recommended that agriculture teachers should be encouraged to incorporate CAT strategy in their teaching as a way of improving motivation to learn agriculture.

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