

Effect of Complementing the Conventional Method of Teaching Agriculture with Video On Performance of Agriculture Theoretical Tests in Secondary Schools

A Case Study of Molo Sub-County, Kenya

Esther Muthoni Maina^{1*}, Christopher A. Onyango², Nancy O. Openda³

^{1,2,3}Department of Agricultural Education and Extension, Graduate School, Egerton University

*Corresponding Author

Abstract: - This study aimed to assess the effect of video instruction as a complement to conventional teaching methods on performance in Agriculture theoretical tests by students in secondary schools in Molo Sub-county. The study adopted a pretest-posttest experimental design where four schools were selected purposively from the list of public secondary schools in the Sub-County, and randomly assigned to either the control and intervention group (two schools per group). Form-one agriculture students in the schools that formed the intervention group (n=89) were taught a topic on Water Supply Irrigation and Drainage using a combination of conventional method and video, while form one students in the secondary schools that formed the control group (n=83) were taught using conventional teaching method only. Participants in the two secondary schools were subjected to an achievement test before and after the six lessons for comparison of the test results. The collected data was analyzed using descriptive and inferential statistics at the 0.05 level of significance with the aid of Statistical Package for Social Sciences. Descriptive analysis showed that students in the intervention group had higher mean scores in the post-test. The analysis of t-tests showed that the use of video instruction had a statistically significant effect on students' performance in the Agriculture theoretical post-tests scores ($t=8.981$, $p=.000$) even after controlling the student pretest-scores. The finding led to the conclusion that the incorporation of video instructions improves students' performance in agriculture theoretical tests. The study recommends that schools within the study area as well as other parts of the country should embrace the use of video instruction in the teaching of Agriculture in order to boost students understanding of theoretical aspects of the subject.

Keywords: Agriculture, Performance, Video Instruction, Theoretical Test, Kenya.

I. INTRODUCTION

In formal education, curriculum implementation is a composite of the teacher, learner, resources, methodologies, anticipated experiences and outcomes and therefore a successful teacher must have abilities to provide these requirements in order for curriculum implementation to succeed (O'Neill, 2015). However, there are often challenges

to this process which affect the quality and level of curriculum implementation especially with respect to acquisition of knowledge and skills by the learners. In general, teachers use conventional methods of teaching which includes lecture, discussion, fieldtrips and classroom demonstration. These conventional methods often fail to help a teacher meet the goals of a curriculum, and especially so with respect to science based subject such as Agriculture (Harman, 2010).

In conventional teaching, a teacher communicates ideas to learners through direct verbal discourse sometimes called talk and chalk making the teaching process teacher-centered. The implication of this is that learners become discouraged and passive (Zhang, 2012). A need to introduce alternative instructional techniques that help overcome the weaknesses associated with the talk and chalk method is therefore evident. Scientific advancement has made it possible to introduce technology-based methods such as models, filmstrips, overhead transparencies, pictorials, animation, slide shows, films and video into the teaching process. According to Kearney and Schuck (2006), these approaches have strengthened learning opportunities for students whereby video appears to encourage academic rigor by inspiring and engaging students and making the learning process student-centered. There are indications that video could be used as a complement to conventional teaching. As reported by Akpabio (2004), video instruction can expose children to modern agricultural practices and environmental concepts far more than the traditional and conventional classroom teacher can achieve. This is because their interest in watching home video can be exploited in formal school system to teach agricultural practices in a vivid and entertaining manner.

Video-taped instructions in teaching and learning of agricultural science may enhance students' performance especially where the class is over populated. According to Aggarwal(2007), video instructions enhance comprehension and retention. Real life activities like illustration, demonstration and observation of specimens in agriculture

and the environment are brought to the learners in the classroom in an exciting package. The visual nature of some technologies, and particularly animations, simulations and moving imagery, engage learners and enhance conceptual understanding (Eskrootchi & Oskrochi, 2010).

In the United States of America, teachers have employed video instruction as a way of helping educators improve their instructional practices through techniques such as microteaching. Equally in Belgium, Van Mele (2011) found that the use of moving images and video's flexibility was advantageous in training farmers. On the other hand, Video instructions also make learning enjoyable; hence, creating a positive attitude among learners. As Awang et al. (2013) found, students' attitude has a significant effect on learning outcomes. The study recommended that teachers should create enjoyable and attractive learning environment so as to engage students in classroom activities and reinforce a positive attitude towards the subject. Gakuru (2013) points out that, introducing videos that are specific to a topic greatly enhances the learners' interest and motivation towards physics which in turn leads to an overall improved performance. The use of videos has not been sufficiently evaluated in terms of its possible complementary role in the current educational training approaches in the Kenyan context. Therefore the study sought to examine the effect of video instruction as a complement to conventional teaching methods on the performance of secondary school students in agriculture theoretical tests in Molo Sub-County, Kenya

II. MATERIALS AND METHODS

A. Research Design

The study adopted the pretest-posttest design. The experimental design entailed directly manipulating the independent variable in order to observe effect on the dependent variable (Christensen et al., 2014). Specifically, the study utilized the pretest-posttest with control experimental design that entailed creation of a comparison group and collection of data before and after the intervention. This design was selected because the study aimed to examine whether video instructions have effects on students' performance in agriculture tests.

B. Target Population and Sample

This study targeted all form one secondary school Agriculture students (4,220) attending public secondary schools in Molo-Sub-County. The sample comprised form one students in four public secondary schools. The researcher purposively identified the schools that participated in the study based on the following conditions; (1) must be a Sub-County school, (2) must be a mixed school (3) must not have covered the topic of interest at the time of study, (4) must not be using the video-based instruction,(5)must not be implementing another intervention that can directly affect performance in agriculture, (6) must be willing to participate. The four schools were randomly allocated into either

intervention or the control group using the rotary method. This method entailed writing the name of the four schools on small pieces of papers that were then folded and mixed up. A third party was asked to pick two of the folded pieces of papers and the schools whose names were contained therein were included in the intervention group. The other two schools were used as the control. A total of 172 form one students from the selected four schools completed both the pretest and post-test exercises. This group comprised the study sample.

Table 1: Sampling Plan

Group	Sample Size
Intervention	89
Control	83
Total	172

C. Instrumentation

Appropriate achievement test was administered before and after the intervention period. The test was based on the form-one topic, Water Supply, Irrigation, and Drainage. The test comprised of 11 open-ended items/ questions examining acquisition of theoretical knowledge. The test was administered before and after the students was taught either using a combination conventional and video methods or conventional methods only. To ensure validity, the achievement test was subjected to scrutiny by four peers and the two supervisors in the department of Agricultural Education and Extension to ascertain their content, construct, and face validity. To ensure reliability, the achievement test was subjected to a pilot study where reliability was estimated using Cronbach's Alpha coefficient. The test was piloted in one of the schools within Njoro sub-County that has similar characteristics as the sampled schools. A total of 35 students were subjected to achievement during the pilot study. Each of the twelve questions was coded as an Item/ variable into the Statistical Package for Social Sciences (SPSS). Marks scored in each of the questions were entered and the data analyzed using the Cronbach alpha at the 0.7 threshold. The test yielded an alpha value of 0.783 that exceeded the 0.7 threshold that was set by the researcher. Thus, the instrument was deemed to be reliable for use in the main study.

D. Data Analysis

Both descriptive and inferential statistics were employed in the data. The collected data was edited, coded and analyzed using Statistical Package for Social Sciences (SPSS). Percentages, frequencies, mean, and standard deviation were used in the descriptive analysis. The goal of the descriptive analysis was describe each of the variables of interest. Inferential analysis was done using t-tests that helped in comparing the means of students taught using video and those taught conventionally while controlling for the pre-test scores (Lemay, 2017). In this case, the pre-test scores represented the students' prior knowledge in the subject,

which needed to be controlled in order to observe the effect of the methods of teaching. The test statistics was evaluated at the 0.05 level of significance. Results were presented using tables and narratives.

III. RESULTS AND DISCUSSION

The objective of the study was to examine the effect of video instruction on the students’ performance on theoretical tests in Agriculture. To establish this effect, it was first of all important to examine the students’ performances on both the pre-test and post-test. A summary of the student’s performance in the theoretical pre-test is presented in Table 2.

Table 2: Summary of Students Scores in Theoretical Pre-Test

Group	N	Minimum	Maximum	Mean	S.D
All Students	172	9	43	22.93	8.196
Conventional+video	89	9	43	25.77	8.506
Conventional Only	83	9	37	19.88	6.654

The pre-test was essential in this study as it enabled the researcher to assess and control the students’ prior knowledge on the topic being taught. As Table 2 illustrates, the mean score for the students taught using video and conventional methods in the pre-test was 25.77 while that of students taught using the conventional methods only was 19.88. This suggests that generally, students who were taught using both conventional and video methods had greater prior knowledge on the Water Supply, Irrigation, and Drainage topic than their counterparts in the control group. The table also show that the students prior knowledge of the subject varied significantly in both groups. In the conventional+video group, the lowest students had 9% while the highest had 43%. In the conventional only group, the lowest also scored 9% while the highest scored 37%. The standard deviation values also confirm the relatively large dispersion of scores around the mean. Table 3 presents a summary of the students’ scores in the theoretical post-test.

Table 3: Summary of Students Scores in Theoretical Post-Test

Group	N	Minimum	Maximum	Mean	S.D
All students	172	7	96	52.50	21.494
Conventional+ Video	89	7	96	64.17	19.968
Conventional Only	83	11	74	39.99	15.149

As Table 3 illustrates, the mean score for the video + conventional group in the post-test was 64.17 as compared to 39.99 for the conventional group. This implies that generally students taught using both conventional+video methods performed better than the students taught using conventional methods only. There were however major variations in performance among the students in the two groups. The conventional +video group had the largest variation with the lowest student scoring 7% and the highest recording a score of

96%. The standard deviation was 19.968 suggesting that there were huge dispersion in the students’ scores around the mean. In the conventional only group, the lowest students had 11% while the highest scored 74%. The mean score for the entire sample (both the intervention and control group) in the post-test was 52.5%.

The paired sample t-test was used to examine whether method of teaching used had a significant effect on students’ performance in the theory test. This test examined whether this improvement (mean difference) is statistically significant. Results are presented in Table 4:

Table 4: Paired Sample T-test Results on effect of method of instruction on theoretical performance

Paired Differences					t	df	Sig. (2-tailed)
Mean Difference	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
20.115	13.803	1.515	17.101	23.129	13.277	82	.000

As Table 4.6 exemplifies, the difference in the pre-test and post-test mean score was statistically significant ($t= 13.129$, $p=.000$). This implies that the delivery of the lesson using the conventional teaching methods only led to a significant improvement in the students understanding of the theoretical concept related to the subject of Water Supply, Irrigation, and Drainage. (Richardson, 2011).

IV. CONCLUSIONS

Based on the findings, the study concludes that the incorporation of video instructions in the teaching of agriculture has a significant and positive effect on students’ theoretical test performance. Students taught using a combination of video and conventional method had higher mean score in the theoretical test than their counterparts who were taught using the conventional method only. This implies that blending the use of video in Agriculture classes can significantly improve the student understanding of theoretical concepts.

V. RECOMMENDATIONS

Schools within the study area adopt the use of video instruction in the teaching of agriculture in order to improve students’ understanding of theoretical concepts. The schools should provide the necessary resources including computers, projectors, and video content in order to facilitate the incorporation of video instruction in classrooms. To support generalization of findings, future studies should consider replicating this study among different categories of schools such as county and national schools. Future studies should also consider involving Agriculture students from other grades such as form 2, 3, and 4 using different topics besides Water Supply Irrigation and Drainage.

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