THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Effect of Computer Based Instruction on Learner Performance in Art and Design in Public Secondary Schools in Kenya

Gladys Wanjiru Kinyua
Ph.D. Candidate, University of Nairobi, Kenya
P. O. O. Digolo
Professor/Director, Centre for Pedagogy and Andragogy (CEPA), University of Nairobi, Kenya
Dr. B. Ngaruiya
Senior Lecturer & Associate Dean, Department of Educational Communication and Technology, University of Nairobi, Kenya
Dr. S. O. Mwanda
Lecturer, Department of Education Communication and Technology, University of Nairobi, Kenya

Abstract:
The main purpose of this paper is to establish the effect of using computer based instruction on learner's performance in Art and Design in public secondary schools in Kenya. The objective of the study was to establish the difference in the performance of learners who were taught Art and Design using computer based instruction (CBI)and those who were taught using conventional methods of instruction (CM).The study reviewed related literature from other scholars that provided an overview of use of computer based instruction in Art and Design as well as in other subjects. Studies comparing conventional and computer based teaching were also reviewed. This study was guided by Cognitive Load theory which is an instructional theory maintaining that working memory allows the learner to think creatively and logically in order to solve problems. The study was based on the concept that the instructional methods used by the teacher to deliver Art and Design knowledge and skills influence learner performance. The study used quasi experiment of the nonequivalent control group design. Purposive sampling was employed to select the sample size of schools, the Form two students doing Art and Design and their subject teachers. Nine boys' and nine girls' schools were used in the study, a total of eighteen public secondary schools in Kenya. Four hundred and fifty students and eighteen teachers were respondents in the study. The treatment used in this study was computer based instruction while the control was conventional methods of instruction. The main research instruments used to collect data for this study were two: Art and Design Performance Test 1 (ADPT 1) aspre-test and Art and Design Performance test 2 (ADPT 2) as post-test. Additional data was collected through teachers' and students' questionnaires. Data was analyzed descriptively by use of SPSS programme. Descriptive statistics such as bar graphs, pie chart and tables were used to discuss research findings. The study also used t-test as inferential statistics to test the significance of difference in the performance of learners taught using computer based instruction (CBI) and those taught using conventional methods (CM). The study found that there is a significant difference in the two methods of instruction. Learners who were taught Art and Design using Computer based instruction (CBI) showed the most improved performance but the learners who were taught using conventional methods (CM) showed minimum improvement in performance. Further, the study found out that use of computer-based instruction in schools is constrained by inadequacy of personal computers that would encourage individual instruction, lack of computer programmes that are employable in Art and Design and unavailability of internet. Low level of computer literacy among Art and Design teachers confined them to provide instruction using conventional methods. The study recommended that, a strong support at the national level be initiated towards a systematic planning for the use of technology in the schools through improving facilities, equipments and training of the Art and Design teachers to gain computer skills.

Keywords: *Learners' performance, Computer based instruction (CBI), Art and Design, Information Communication and Technology, Conventional methods of instruction (CM), private and public schools*

1. Nature of the Problem

The government of Kenya has identified education and training as the most effective means of facilitating and promoting sustainable social and economic development (Republic of Kenya Vision 2030, 2008).The government is therefore, committed to provide quality education and training to her citizens at all levels. The commitment has resulted in gains like the inception of ICT policy in the year 2006 which has facilitated significant growth and improved use of ICT in an effort to make Kenya an industrialized nation by the year

2030.Art and Design is a subject that can enable learners to develop varied talents through the application of contemporary technology. In support of individual development and in line with Vision 2030, Talabi (1979) postulated that Art and Design activities offer great scope for developing other disciplines like engineering, architecture and other areas that can facilitate technological and industrial development. To achieve industrialization by the year 2030, there is need to focus on the development of learners' talents, creativity and problem solving abilities through works of Art and Design. Multiple research studies have shown that a strong Art and Design foundation can build creativity, concentration, problem solving abilities, self- efficacy and coordination, which are essential in individual development (Eisner & Day, 2004; Farrell & Meban, 2003). To get effective results from all areas of education and industrial development, all learners should be given the opportunity to develop individual capabilities (Fiske, 1999; Deasy, 2002).

In order to realise industrial development, there is need to focus on the application of contemporary technology in solving Art and Design problems as indicated by one of Art and Design objectives (KNEC 2014). It is therefore, imperative that teachers use various instructional methods and approaches to enhance learning and make the subject matter clearer and better understood by the learners. This calls for the utilization of technology to enhance pedagogical approaches that support creativity, innovation and critical thinking. One such instructional method which has been proved to have positive results by researchers is computer based instruction (Sharma, 2003). The use of this method of instruction can result in enabling the application of the acquired knowledge and attitudes for self-reliance in the world of work (KNEC 2013). This is because technological growth has come with very useful facilities which could improve classroom instruction in Art and Design, consequently improving learners' performance. Examples of such products are software like Adope Illustrator, SuperPaint, CorelDraw, PhotoShop, AutoCAD, PageMaker and Designer Studio (Bhattacharya and Sharma, 2007; Sharma, 2003).

Despite the availability of technological facilities, Daniels (2002) points out that there is a global imbalance in the implementation of contemporary technology in education and especially in instructional situations. Cullen (2003) observes that computer use in education in developed countries has been embraced more than in developing countries due to the minimum funds extended to schools and other educational institutions in developing countries by the governments. In Britain, Crook, (1994) noted that computer based instruction (CBI) has been used to improve instruction especially in Art and Design, mostly in the area of graphics. Similarly, the full potentials of computer in assisting or managing instruction are yet to be exploited in Nigeria. According to Achuonye (2011), various factors have been identified as hindrances to the use of computers in schools in Nigeria. Some of the related factors are; cost of purchase, unreliable electricity supply and computer illiterate teachers. In Kenya, teachers are experiencing similar challenges that minimize the use computers in instructional situations (Migwi, 2009).A similar finding was reported by Odera (2011) in a study on comparison of the use of computers in public secondary schools in Nyanza province. The findings revealed that teachers used computers in English language, science, mathematics, communication skills and computer literacy. There was no mention of computer use in Art and Design yet, Heinich, Molenda & Russel (2002) highlight that the computer is a useful tool for teaching and learning Art and Design especially in graphics. The understanding of this topic is important to every Art and Design student as the knowledge of graphics skills are in demand in the job market of advertising, creating logos, posters and book covers, which can create employment for students with the necessary skills. This study therefore, set out to establish if computer based instruction significantly improves learners' performance in Art and Design in public secondary schools in Kenya.

Although there may be available computers in some public secondary schools where Art and Design is offered at KCSE, the computers may not be fully utilized especially in graphics. According to the Kenya National Examinations Council (KNEC) report learner's performance in Art and Design is poorly performed (KNEC, 2014).The acquisition of graphic design concepts and skills may be affected by a variety of factors one of which could be related to instructional methods used during content delivery. The objective of this study was to establish the effect of computer based instruction (CBI) on learner performance in Art and Design in public secondary schools in Kenya. The study sought to accept or reject the following hypothesis; $H_0$1: There is no significant difference in the mean scores of learners who were taught Art and Design using computer based instruction (CBI) and those who were taught using conventional methods (CM).

Alot of research has been carried out in secondary schools, colleges and universities globally on the use of computers in teaching and learning, in search of instructional methods that can enhance learning. Researchers from developed countries have reported positive gains in the use of computer based instruction across all curriculum subjects, for example, computer literacy, calculations, data manipulation, word processing and presentation, (Heinich, Molenda, and Russell, 2002). In Kenya, Mwanda (2002) investigated three instructional methods, two using computer and one using conventional methods. He looked at three types of instruction; that is, computer assisted instruction (CAI), individualised computer assisted instruction (ICAI) and conventional methods of instruction (CM). The study found the use of computer in teaching statistics in geography successful but equally as effective as conventional method. It also reported that learners had positive attitudes towards geography and the use of CAI.

Jesse, Twoli and Maundu (2014) investigated the enhancement of science performance through computer assisted instruction among selected secondary school learners and the influence of instructional methods on efficiency of content delivery to the learner. The study was related to finding out factors which contribute to poor performance in science subjects and among them the inappropriate teaching approaches that are teacher-centered rather than learner-centered. Quasi-experiment of the nonequivalent control group design was used, based on the performance in science when the Conventional Instructional Techniques (CIT) are used and when a combination of computer-assisted instruction (CAI) and conventional instructional methods are used. Biology, Chemistry and Physics teachers and Form Two learners from six provincial secondary schools situated in the greater Embu district were involved in the study. The study found out that learners taught through computer assisted instruction (CAI) performed significantly better than learners taught through conventional instructional techniques (CIT) in science. Based on these findings of the study, it was concluded that use of computer-assisted instruction improves secondary school learners' performance in science. This means that computer

technology has provided teachers and learners with contemporary tools which continue to have a profound effect on classroom instruction.

Thiong'o, Ndirangu and Okere (2014) in a study on effects of computer-based simulation module on secondary school students' achievement in understanding of magnetic effect of electric current, found CBI successful as an instructional method. The study affirms that the use of the computer produced positive results, causing improvement on students' achievement. It aimed at finding out the effect of computer-based simulation module on students' achievement in magnetic effect of an electric current.The study confirmed that computer based instruction improved learners performance.

2. Research Methodology

The study adopted quasi experiment of the nonequivalent control group design. The design was found appropriate because the nonequivalent control group design does not involve random assignment of subjects to groups. According to Gay (1992) an advantage of this design is that since classes are used as they are, possible effects from reactive arrangements are minimized and subjects may not even be aware that they are involved in a study. Purposive sampling was used to select eighteen schools offering Art and Design in ten Counties in Kenya. Four hundred and fifty students and eighteen Art and Design teachers from nine boys' and nine girls' schools were the respondents in the study. The selected schools were public with appropriate facilities for Art and Design and running computers. The main data collection instruments were Art and Design Performance Test 1 which was used as a pretest and Art and Design Performance test 2 which was administered as a post test. Questionnaires were filled by teachers and students to support results from the performance tests. Data was analyzed through use of descriptive and inferential statistics. T-test was done to test the significant of difference in the performance of learners taught using CBI and those taught using CM.

3. Study Findings and Discussion

The study found out that there is a significant difference on learner's performance between the learners who were taught using computer based instruction and those who used conventional methods. Learners who were taught Art and Design using Computer based instruction (CBI) showed the most improved performance while those taught using conventional methods (CM) showed the least improvement. Table 1 shows the pretest and posttest mean scores of learners taught using CBI and learners taught using CM in selected boys and girls schools.

Mode of Instruction	Pretest Mean Scores	Standard Deviation	Post Test Mean Scores	Standard Deviation
CBI Boys	20.87	4.58	28.81	6.37
CM Boys	19.49	3.60	19.64	3.88
CBI Girls	28.00	4.87	30.73	4.74
CM Girls	20.90	2.55	21.57	3.12

Table 1: Pre test and Post test Mean Scores of CBI and CM Groups

To test the hyphothesis if there was a significant difference on learners' performance after they were taught using Computer based Instruction (CBI) and conventional methods (CM),a t-test was done. The hyphothesis was stated as follows;

- Ho_1: There is no significant difference in the mean scores of learners who were taught Art and Design using CBI and those who were taught using CM.

To test this hypothesis, the t-test statistic was used to compare the posttest mean scores of learners who were taught using computer based instruction CBI and learners who were taught using conventional methods CM. The results are shown on Table 2.

Mean	Std. deviation	Std. Error Mean	t Value	df	Sig. (2-tailed)
12.167	6.304	0.515	23.638	149	0.000

Table 2: t-test of Learners Taught using CBI and CM

Table 2 shows the comparison of posttest mean scores of the learners exposed to computer based instruction (CBI) and the learners exposed to conventional methods (CM). The calculated mean when CBI and CM are paired is 12.167, standard deviation 6.304, standard error 0.515, distribution frequency was 149, t-value of 23.638 for the posttest. The level of significance was 0.000 and therefore the null hypothesis was rejected. This implies that there was a significant difference in the mean scores of learners who were taught Art and Design using CBI and those who were taught using CM. This implies that the learners who were taught using (CBI) computer based instruction performed better than the learners who were taught using (CM) conventional methods of instruction.

Further the study found out that use of computer-based instruction in schools is constrained by inadequacy of personal computers that would encourage individual instruction, lack of computer programmes that are employable in Art and Design and unavailability of internet. Low level of computer literacy among Art and Design teachers confined them to give instruction using conventional methods.

This section presents findings on comparison of two instructional methods namely; computer based instruction (CBI) and conventional methods of instruction (CM) as reflected by learners' performance. The intention was to find out which of the two teaching methods brought about improved learners' performance in Art and Design. This objective of the study therefore, sought to

establish whether statistically there was a difference in the Art and Design scores obtained by students who were taught using CBI and those who used CM. To achieve this objective, data was collected, organized and analyzed.

The purpose of the pretest was to find out the learners' level of mastering graphics knowledge and skills before the experiment was carried out. The results reflected some improvements in all the groups. At a glance on Table 1, reflects that the pretest scores for both boys and girls were lower than post test scores. Boys had a mean 62.60 in the pretest when they had not been exposed to CBI which improved to 86.44 in the posttest after learning with CBI. The group of boys who used CM had 58.48 in pretest and 58.92 in post test which is a small improvement. Girls on the other hand improved from 84.00 in pretest to 92.20 in posttest after exposure to CBI. The girls who used CM had 62.72 in pretest and 64.72 in posttest which is not a significant difference. The observation is that the learners who used CM made very minimal improvement in their performance.

4.1. Conclusion

This study concluded that the use of computer based instruction in teaching graphics in Art and Design is more effective than the conventional methods that are mostly used by Art and Design teachers in public secondary schools in Kenya. If Form two learners' performance improved after learning using computer based instruction for only eight weeks, then if CBI is used from Form one to Form four, there could be great improvement on learners' performance in Art and Design at the Kenya Certificate of Secondary Education (KCSE) in public secondary schools in Kenya.

4.2. Recommendations

Based on the findings the following are the recommendations from the study:

i. The Ministry of Education Science and Technology should formulate clear policies to enhance and support the teaching of Art and Design using computer based instruction.
ii. The Kenya Institute of Curriculum Development (KICD) should organise in-service and pre-service courses for secondary school teachers regularly to equip them with computer skills.
iii. The Kenya National Examination Council should set alternative questions that can be done using the computer especially in graphics.

4.3. Recommendations for Further Research

The following suggestions for further research were recommended:

i. Research on Computer based instruction in other areas of Art and Design should be carried out since this study covered only graphics.
ii. More research on computer based instruction in preschools and primary schools in Art and other subjects should be undertaken.
iii. Additional research on computer based instruction in Art and Design and in other subjects at public and private secondary schools in Kenya is recommended.

5. References

a. Achuonye, K.A. (2011). Using Computer in science class: The interactive effect of gender. Rivers State University of Education. Port Harcourt, Nigeria. Journal of African studies and development,3 (7), 131-134.
ii. Bhattacharya, I. & Sharma, K. (2007). 'India in the knowledge economy– an electronic paradigm', International Journal of Educational Management **Vol**. 21 No. 6, Pp. 543- 568.
iii. Crook,C.(1994). Computers and the collaborative experience of learning. London: Routlegde.
iv. Cullen, R. (2003). The Digital Divide: A Global and National Call to Actions. The Electronic Library, 21(3), 247-257.
v. Daniels, J. S. (2002). "Foreword" in Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development. Paris: UNESCO.
vi. Deasy, R. J.(Ed.). (2002). Critical links: Learning in the Arts and Student Academic and Social Development. Washington, D.C.: Arts Education Partnership. Retrieved august 9, 2016 from htt://aep-arts.org/publications/info.htm?publications-id=10.
vii. Digolo, O. O. (1986). A Proposal for Effective Implementation of Art Curriculum in a Changing Cultural Environment: the Case. Unpublished M. ED Research paper. Kenyatta University.
viii. Eisner, E. W. & Day, M. D. (Ed.) (2004). Handbook of Research and Policy in Art Education, Mahwah, N. J: Lawrence Erlbaum Associates.
ix. Farrell, G. & Shafika, I. (2007). Survey of ICT and Education in Africa: Kenya Country Report, Washington DC: info Dev/World Bank. Available from www.infodev.org.Retrievedon 17th October 2015.
x. Gombe, (1990). N.K.C. The Status of Art in the Kenya Curriculum. Unpublished PhD. Thesis. Kenyatta University.
xi. Heinich, R.Molenda, M. Russel, J.D. &Smalding,S.E. (2002): Instructional media and technology. New Jersey:Prentice-Hall.
xii. Jesse, Samuel N.; Twoli, Nicholas V.; and Maundu, John N. (2014) "Enhancement of Science Performance through Computer -Assisted Instruction among Selected Secondary School Learners in Kenya," Kentucky Journal of Excellence in College Teaching and Learning: Vol. 12, Article 4.
xiii. KNEC (2014). The Kenya National Examinations Council. The year 2013 KCSE Examination Report. With Question Papers & Marking Schemes. Volume 4: Technical &creative Arts.

xiv. Migwi, C. N. (2009). An assessment of Public secondary school Teachers Preparedness in Integrating ICT for Instruction: A Case of Ruiru Division, Thika District. Kenyatta University: Unpublished M.ED thesis.

xv. Mwanda, S. O. (2002). Effects of computer Assisted Instruction on the Teaching of Geography in Kenyan Secondary Schools. Unpublished PhD. Thesis. University of Nairobi.

xvi. Nyagah, G. M. (1997). Pupils Performance and Attitudes Towards Art and Craft in Kenya's 8-4-4 Education System in Embu District. University of Nairobi: Unpublished PhD Thesis.

xvii. Odera, F.Y. (2011). A Comparison of the use of Computers by secondary school teachers in Kenya. International Journal of Science and Technology, volume 1 No. 6, December 2011.

xviii. Oludhe, D. (2003). An Exploration of the Creative Performance of Secondary School Pupils and the implications for the Teaching of Art in Kenya. Kenyatta University: Unpublished Ph.D. Thesis.

xix. Republic of Kenya, (2007). Kenya Vision 2030: A globally competitive and prosperous Kenya. Nairobi: Government Printers.

xx. Sharma, R. (2003), 'Barriers in Using Technology for Education in Developing Countries', IEEE0-7803-7724-9103.Singapore schools', Computers & Education Vol.41, No.(1),Pp;49—63.

xxi. Talabi, G. (1979). Art Teaching in African Schools. Ibadan: Heinemann Educational Books.

xxii. Thiong'o, J. K., Ndirangu, M., and Okere, M. (2014). Effects of Computer- based Simulation Module on Secondary School Students' Achievement in Understanding of Magnetic Effect of Electric Current. Global Educational Research Journal: ISSN-2360-7963: Vol.2(8).