

Computer based instruction and gender effect on learners' performance in Art and Design in public secondary schools in Kenya.

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Abstract

The paper explored possible gender influence on students' performance after learning graphics in Art and Design using computer based instruction (CBI), traditional methods of instruction (TMI) and combined methods (CMI). The study used quasi-experimental design of non equivalent groups. The target population for the study was 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 groups had three hundred students while control groups had one hundred and fifty students. CBI and CMI were the treatment groups which had three girls' and three boys' schools each. There were two control groups, consisting of three boys' and three girls' schools using TMI. Both control and treatment groups had boys and girls to cater for gender comparison in performance. The research instruments used to collect data for this study were two: Art and Design performance test (ADPT 1) and (ADPT 2), teachers' and students' questionnaires. Data analysis used SPSS programme and presented data in percentages, tabular and bar graphs. This study found that gender had a significant effect on performance of the learners using the three modes of instruction. The study also found that the topic on graphics design at the secondary school level in Kenya was poorly done and girls out performed boys. Further the study found out that use of computer-based instruction in schools is constrained by inadequacy of computers and absence of computer programmes that are employable in Art and Design. Lack of Internet connectivity and level of computer literacy among Art and Design teachers confined them to give instruction using traditional 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. Art and Design teachers should be trained to gain computer skills. The study also recommended research on factors that contribute towards gender disparities on learners' performance in Art and Design in secondary schools in Kenya.

Key words: Computer based instruction, traditional methods, combined methods, gender, learners' performance.

1.1 Introduction

Education in Kenya is regarded as one of the most instrumental tool to facilitate social and economic development. It is one of the most effective means a nation has at its disposal for promoting sustainable social and economic development (Republic of Kenya, 1999). It is no wonder that one of the national goals of education in Kenya is to promote social equality and responsibility. Education should therefore, promote social equality and foster a sense of social responsibility within an education system which provides equal opportunities for all. Through education, every learner should be exposed to varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability or geographical environment (KIE 2002).

It is therefore important to ensure that both boys and girls get equal opportunities in education despite the fact that there are innate biological differences between girls and boys which enable them to have varied abilities. In relation to the differences Muriithi (2013) highlights that men are physically stronger, less resilient, have greater spatial, numerical and mechanical abilities and tend to see the world in terms of objects, ideas and theories. Women on the other hand mature physically and psychologically at an earlier stage, are more affilliate and nurturing, have higher and more precocious verbal skills and see the world in personal, aesthetic and moral terms. It is likely that gender differences are influenced by the varied abilities which in turn may reflect in educational outcomes. This study therefore sought to highlight the findings on the effect of gender on learners' performance in Art and Design after using three methods of instruction, namely computer based instruction (CBI), combined methods of instruction (CMI) and traditional methods of instruction (TMI).

1.2 Research hypothesis

The study sought to accept or reject the following hypothesis;

Gender has no significant effect on the mean scores of learners who were taught Art and Design using computer based instruction (CBI), combined methods of instruction (CMI) and traditional methods of instruction (TMI).

1.3 Research Objective

Gender has no significant effect on the mean scores of learners who were taught Art and Design using CBI, CMI and TMI.

2.1 Brief Literature Review

This study reviewed related literature which provided findings from previous researches on gender effects on learners' performance. Studies have been done to examine the effects of gender on learners' performance at different levels and in different subjects in Kenya and other

countries. Dermirbas and Dermirkan (2007) carried out a study on learning styles of design students and the relationship of academic performance and gender in design education in Turkey. The study focused on design education using Experiential Learning Theory (ELT) and explored the effects of learning styles and gender on the performance scores of freshman design students in three successive academic years. The findings of the study revealed that the learning style preferences did not significantly differ by gender in all three groups. Further the results indicated that the performance scores of males were higher in technology-based courses, whereas scores of females were higher in artistic and fundamental courses and in the semester academic performance scores (GPA). These findings agree with the varied abilities in relation to gender highlighted by Muriithi (2013). Similarly, Achuonye and Olele (2009) found male dominance in computer usage in another study. This finding is in line with Miller (2002) in Eshiet (2009) who observed that computer aided learning ensures students motivation and differentiates between students' capability levels.

Another study in Nigeria, carried out by Anulobi (2009) in Fine Arts with Video Compact Disc Instructional Package (VCDIP), had contrary findings. He found out that gender did not have any impact because both the boys and girls had similar scores and none outperformed the other. Another study in Nigeria by Achuonye (2011) that there is no significant difference in the performance of the boys and girls in the use of computer in the learning of Science - Biology. In other words, gender does not affect the use of computer in the learning process. In her study on the effect of gender on the use of computer in a science class and its effect on the students' academic performance in Nigeria, she found out that the use of the computer is weakened by factors such as gender stereotyping. Results showed that gender had no significant effect on the use of computer, but the use of computer in teaching improved the academic performance of the students.

Studies have shown differences in the attitudes of male and female students to the use of computer in schools. According to the study carried out by Spotts, Bowman and Mertz (1997) in USA on gender and use of instructional technologies males rated their knowledge and experience with some innovative technologies higher than did females. For frequency of use, no significant differences were found with the exception of video, where females indicated use that is slightly more frequent.

The national curriculum in Kenya requires Art and Design students to record and analyze firsthand information manually. In the past seven years, the Kenya National Examinations Council (KNEC) has recorded disparities in learners' performance between boys and girls in Art and Design. The mean scores show a clear gap in girls' and boys' performance where girls have outperformed boys in seven consecutive years (KNEC 2008; 2009; 2010; 2011; 2012; 2013; 2014). There is need therefore, to find out why girls consistently perform better in Art and Design than boys. Though these studies have been carried out, a gap exists as no study has been undertaken to examine the effect of gender after using CBI, TMI and CMI to determine their effects on learners' performance in Art and Design in Kenya.

3.1 Research Methodology

The study adopted quasi experimental design of non equivalent groups. 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 pre test and Art and Design Performance test 2 which was given as a post test. Questionnaires were filled by teachers and students to support results from the performance tests. Data was analyzed descriptively through use of Statistical Package for Social Sciences. Paired t-test was done to test whether gender caused significant difference in the performance of learners taught Art and Design using computer based instruction, traditional methods of instruction and combined methods of instruction.

4.1 Study findings

This section presents analysis of data related to gender effects on learners' performance after having been taught using CBI, TMI and CMI, the three modes of instruction. Interpretations are based on descriptive and inferential analysis. An Art and Design performance test was administered to all the schools that had been selected for the study. Table 4.1 shows the pretest and post test mean scores of learners taught using CBI and learners taught using TMI in selected boys and girls schools.

Table 4.1: Pre test and Post test Mean Scores of CBI and TMI Groups

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

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 4.1, it is evident that the pretest scores for both boys and girls were lower than post test scores. Boys had 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 TMI 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 TMI had 62.72 in pretest and 64.72 in posttest which is not a notable difference.

After using TMI and CMI the results of post test and pre test (ADPT 1 and 2) in girls' schools showed that there was an improvement in mean scores in all schools after an 8 week treatment. Boys who used combined methods of instruction (CMI) improved from 61.08 during pre test and 88.36 in post test respectively. Girls on the other hand also had improved from 74.20 to 86.08. It was clear that the learners who used traditional methods of instruction had the lowest scores compared to the learners who used combined methods of instruction. Table 4.2 presents the scores of the two groups in both boys' schools and girls' schools.

Table 4.2: Pre test and Post test Mean Scores of TMI and CMI Groups

<i>Mode of Instruction</i>	<i>Pretest Mean Scores</i>	<i>Standard Deviation</i>	<i>Post Test Mean Scores</i>	<i>Standard Deviation</i>
TMI Boys	19.49	3.60	19.64	3.88
CMI Boys	20.36	2.59	29.45	6.12
TMI Girls	20.90	2.55	21.57	3.12
CMI Girls	24.73	5.01	28.69	5.38

From Table 4.2 it is also clear that boys TMI mean scores in pretest and post test are almost at the same level while girls too had just a slight improvement of 2.0. However, boys outperformed girls in the post test in CMI groups where girls had 86.08 and boys with 88.36. This improved performance could have happened because the Art and Design teachers from the Boy's schools which used CMI were falling in the 20-39 years age bracket, and had a higher level of computer literacy than the teachers in the girls' schools. The teachers were therefore enabled to instruct learners faster using the computers without having to wait for assistance from the computer teachers.

The post-test mean scores results from girls who were taught using the three modes of instruction were compared. Figure 1 shows the comparison of the mean scores.

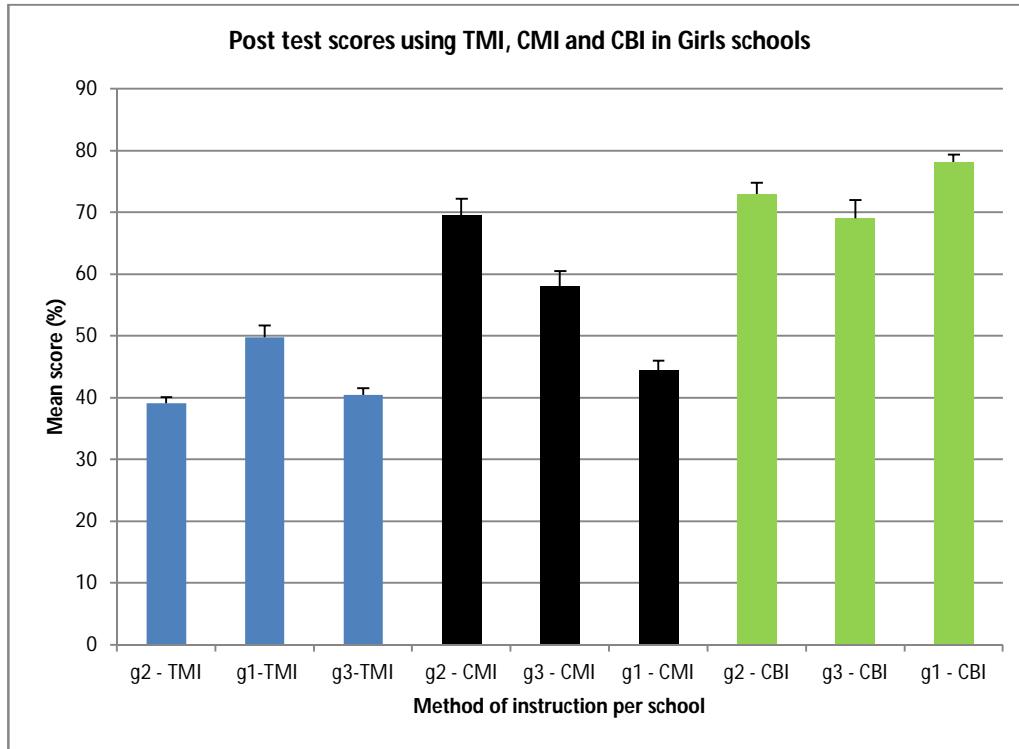


Figure 1: Post test mean scores using TMI, CMI and CBI in Girls' Schools

Figure 1 shows mean score results of post test (ADPT 2) in girls' schools. CMI g2 which had a mean score of 64.96% in the pretest improved to 69.52% in the posttest after using a mixture of CBI and TMI during the experiment, the method referred to as CMI. CBI g1 which used computer based instruction (CBI) had a mean score improvement from 64.48% in pretest to 78.24% in posttest. It was clear that schools using traditional methods of instruction (TMI) had the lowest mean scores. The learners who were taught using computer based instruction (CBI) in girls' schools had the highest mean scores while those taught using combined methods of instruction (CMI) came second to the CBI group. It was noted that although the schools which taught using TMI were not treated, they too showed a slight improvement in post test results. It is assumed that the Art and Design teachers taught with zeal after the training as research assistants. The training motivated them to try out the new skills with the learners. The learners were keen too as they have indicated in the questionnaires. They indicated that they were excited to use computers in Art and Design. Figure 4.2 shows the results from boys' schools on the use of CBI, TMI and CMI on learners' performance in Art and Design.

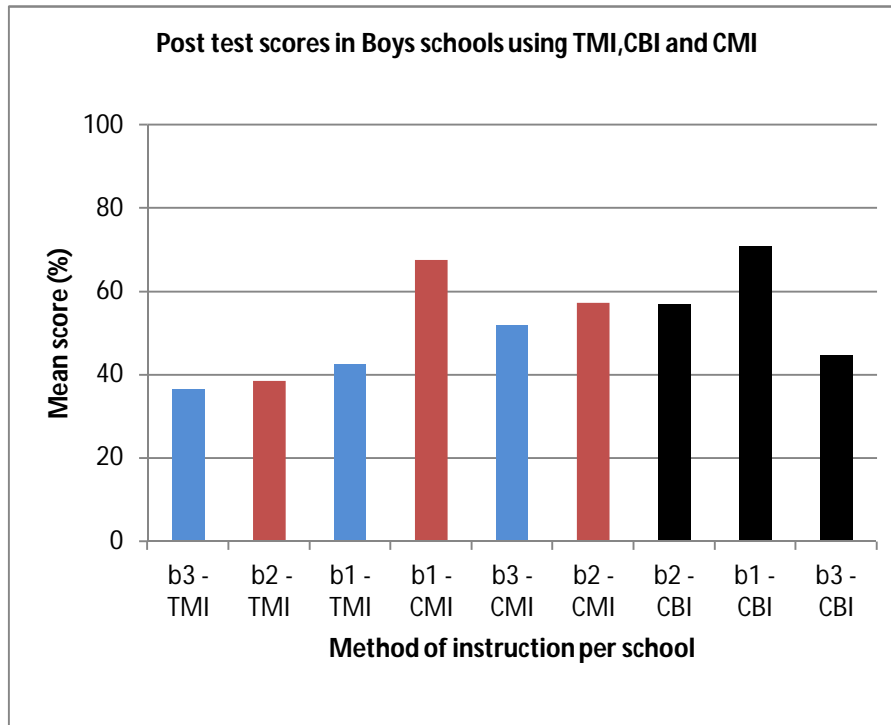


Figure 4.2: Post test mean scores after using TMI, CMI and CBI in boys' schools

It is interesting to observe that learners' performance for both boys and girls improved significantly after they were taught using computer based method of instruction (CBI). Another improvement observed was after learners were exposed to combined methods (CMI), which came second to CBI. The least mean scores were reflected by the group which used traditional methods (TMI). This reflected in both boys' and girls' mean scores.

To find out whether gender has any effect on learners' performance in Art and Design after they were taught using CBI, CMI and TMI, a t- test was carried out. The hypothesis is stated as follows; H_{04} : Gender has no significant effect on the mean scores of learners who were taught Art and Design through CBI, TMI and CMI. To find if there was a significant difference in learners' performance when the three methods of instruction were used, a t- test was used to compare the performance of female and male learners who were exposed to CMI .

Another t-test was calculated based on the same hypothesis but comparing the mean scores of girls and boys who used CBI to learn graphics in Art and Design. Table 4.6 shows the results.

Table 4.3: Paired t-test comparing CBI girls and boys mean scores

Mean	Std. Deviation	Std. Error Mean	t Value	df	Significance
7.920	7.964	.920	8.612	74	.000

The Table 4.3 displays the comparison of girls' and boys' mean scores who used CBI as a method of learning graphics in Art and Design. Since the Table value of significance, 2-tailed test is less than 0.05 and df is 74 the study rejects the null hypothesis. The results show that gender was statistically significant on the mean scores of learners who were taught graphics in Art and Design through CBI, TMI and CMI. It is clear that girls had the most improved performance when exposed to CBI and CMI as compared to their performance when TMI was used in giving instructions. Given that TMI are the usual conventional methods used to teach Art and Design, the results of this study shows that it is imperative that contemporary methods need to be employed because they are available and have been proved effective in other studies and in this study. CBI and CMI have been proved that they can give more improved learners' performance in Art and Design which has been confined to free hand products in the past.

The trend of girls out performing boys in Art and Design in KCSE is evident from the Kenya National Examinations reports (KNEC 2008; KNEC 2009; KNEC 2010; KNEC 2011; KNEC 2012; KNEC 2013; KNEC 2014). In seven consecutive years girls have been outperforming boys in Art and Design at KCSE. Table 4.7 highlights this trend for seven years.

Table 4.4: Gender and Learners' Performance at KCSE in the years 2008-2014

YEAR	2008	2009	2010	2011	2012	2013	2014
Boys	65.55	58.45	58.53	53.57	62.00	55.38	52.74
Girls	66.50	58.76	61.16	57.36	67.23	57.07	53.60

Data analysis results showed that girls' schools performed slightly better than boys' schools in Art and Design with girls' schools scoring 52.77 % while boys' school scored 47.23%. The findings of this study were similar to the Kenya National Examination Council's overall candidate's performance from 2008 to 2014 (KNEC 2008-2014) (See the graphs below)

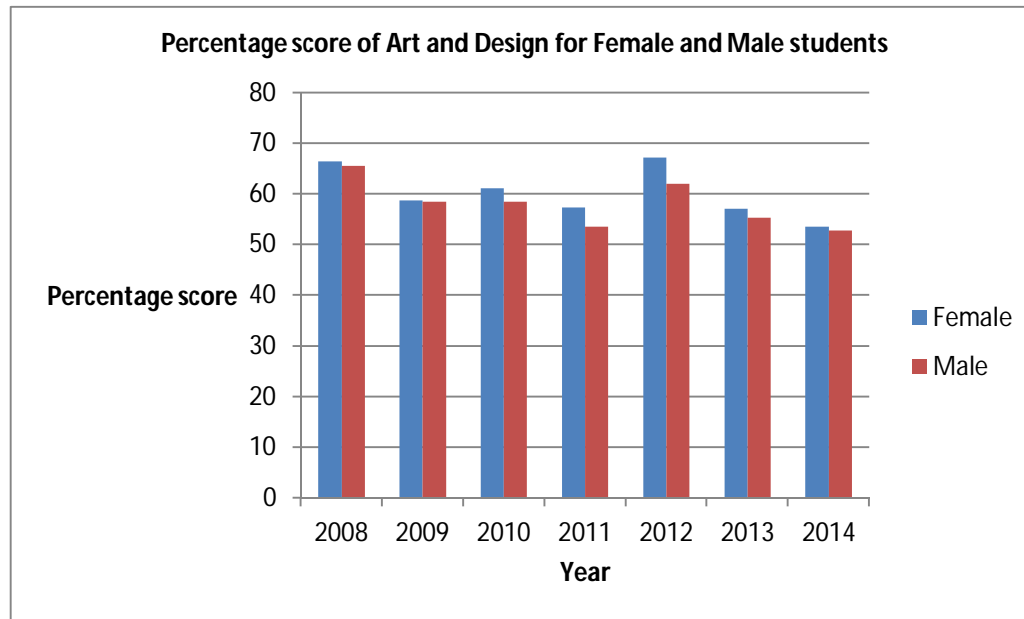


Figure 4.8: Male and Female Performance

The hypothesis that gender has no significant effect on the mean scores of learners who were taught graphics in Art and Design through CBI, TMI and CMI was rejected. The hypothesis was rejected as gender effect was clearly statistically significant on the mean scores of learners who were taught graphics in Art and Design through the three teaching methods. This shows that performance in graphics in Art and Design through all the three teaching methods is higher for girls than for boys.

5.1 Conclusions and Recommendations

This study established that gender had influence in learners' performance after computer based instruction, traditional methods of instruction and combined methods are exposed to the learners. Gender was found to have a significant effect on learners' performance as girls mean scores were higher than mean score of boys. This confirms the trend observed from the KNEC reports from the year 2008 to 2014, that girls had performed better in Art and Design than boys. More research is recommended for determining the factors that cause gender disparities on learners' performance in Art and design in secondary schools in Kenya.

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