

Colour in Instructional Computer Graphics Design and Students' Performance in Fine Arts in Private Secondary Schools in Akwa Ibom State of Nigeria

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Abstract

This study set out to determine the effect of colour in computer graphics designed instructional materials on students' academic performance in fine arts in private secondary schools in Akwa Ibom State. A simple random sample of 60 SS II fine arts students from two private secondary schools was used for the study. These two schools were purposively selected from five private secondary schools that offer fine arts at SS II class. The non randomized control group pre-test-post-test experimental design was used in carrying out the study. One research instrument named, Student Performance Test in Fine Arts (SPTFA) was used in gathering data. The analysis of data involved the use of descriptive statistics of mean, standard deviation and analysis of covariance (ANCOVA). The result obtained from the analysis showed that students taught using Computer-Aided designed (CAD) instructional materials performed significantly better than those taught without using any (CAD) instructional materials. Colour showed high significance. It was therefore recommended among other things that computer graphics should be effectively used in the preparation of instructional materials because of its overall significant effect on the students' performances in fine arts. It was suggested that the proprietors of the private secondary schools in Akwa Ibom State should establish Desktop publishing unit for the development of quality print instructional materials.

Keywords: Colour, computer graphics, computer-aided design (CAD), instructional materials, students' performance.

1.0 Introduction

In fine arts as in any other discipline, various instructional methods and approaches are used by teachers to make the subject matter clearer and better understood by the learners. Teachers and educators have always been interested in finding methods which will enhance learning. This has engendered several researches in the area of methods of teaching fine arts. A few of these researchers on methods of teaching fine arts include Ekwere (2005) and Uti (2006). According to Ekwere, the use of instructional materials for lessons is observed to be inadequate. The few that are used are being selected and utilized without due consideration to what Ekpo (1988) offers as guidelines for designing instructional materials.

Visuals are seen to contribute to effective classroom performance, no wonder Mackenzie (2005) affirms that visuals enhance classroom performance and also add professional solutions to classroom teaching and learning problems. It is observed by Proffit (1996) that the difficulty commonly encountered in the preparation of print instructional materials is the preparation of the artwork. Proffit reveals that the reason for such difficulty and poor artistic rendition is as a result of the abuse of the visual design tools. The development of graphic design application soft wares like, Adobe illustrator and PageMaker, Designer studio, CorelDraw, Photoshop and AutoCAD are known to have provided possibilities to improve the use of these visual design tools in our instructional graphics.

Proffit (1996) affirms that the use and misuse of colour in instructional visuals can have impact on students' performance. The same may be applied to other visual tools if not properly used. "The utilization of visual elements of arts namely: line, space, value, texture, colour, shape either singularly or combined in computer graphic design has a forceful appeal to the emotions of people who perceive them" (Jirousek, 1995). Learners who are exposed to learning through the use of these visual elements would likely be motivated to achieve more in their learning and consequently their performance than those who may have been taught fine arts without using these elements (Rieber, 1990)

According to UNESCO (2002), improving the quality of education through the diversification of contents and methods and promoting experimentation, innovation, diffusion and sharing of information and best practices are UNESCO's strategic objectives in education.

This study investigated the use of colour in computer-aided designed instructional materials and students' performance in fine arts in private secondary schools in Akwa Ibom State.

Colour is one of the most powerful visual elements. It has tremendous expressive qualities. An understanding of the uses of colour is crucial to an effective composition in design. Colour is probably best considered a secondary graphic element in the design of instructional materials (Rieber, 2000).

In selection of colour for use in instructional materials, the designer must be conscious of the fact that colour differ greatly in their affective and attentive values. Some colours are described as active, lively, restless, cold, retreating, advancing; others seen subdued, timid, contrasting and warm. Each characteristic must be well applied by the designer for best instructional outcome. In selecting colour for secondary schools and tertiary institutions, depending on the subject, Ekwere (2005) proposes that subtle colours work well, such as light sage greens and refreshing blues and green with brighter trendy and more saturated hues used as accent colours. Skaalid (1999) is of the opinion that instructional materials should be designed in shades of grey, black, and white first with colour added later in fashion which adds to instructional effectiveness.

Computer graphics has inexhaustible palette of colour for selection. In designing and developing instructional materials through the use of computer, the colours can be easily mixed, toned, filtered and evenly rendered and printed out without rough edges and spatial chromatic defects. More so, application of colour with the computer provides the designer with the complete tools and colours to work with. Therefore, stepping up the quality of neatness and visual effects.

1.1 Statement of the Problem

Uzoagba (2000) and Wangboje (1982) observe that there is poor performance of students in fine arts in public examinations. Many researchers blame the poor performances on inadequate teaching by teachers, which includes ineffective use of instructional media. Researches are done in the utilization of instructional media to improve learning, but the utilization of instructional computer graphic design is not given much emphasis, especially, regarding the effective application of the elements of design in visual communication strategies. Therefore, this study examined the effect of Colour in Instructional Computer Graphics design on student's performance in fine arts.

1.2 Purpose of the Study

The purpose of this study was to determine the effect of the utilization of colour in Computer-Aided designed instructional material on students' performance in fine arts in private secondary schools in Akwa Ibom State.

1.3 Research Questions

One research question was raised to guide the study.

Is there any effect in utilization of colour in Computer-Aided designed instructional material on students' performance in fine arts in private secondary schools?

1.4 Hypothesis

One hypothesis was formulated to give direction to the study.

There is no significant effect of the utilization of colour in Computer-Aided designed instructional materials on students' performance in fine arts in private secondary schools.

2.0 Methods

The study made use of the non randomized control group pre-test –post –test experimental design. The pre-test – post-test experimental design was used to help in examining the effects of the use of colour as a visual element in computer aided designed instructional materials on students' performance in fine arts. Intact classes were used for the experiment.

2.1 Population

The population for this study consisted of all the (SS.11) fine arts students in the private secondary schools in Akwa Ibom State.

2.3 Sample and Sampling Technique:

A sample size of 60 (SS 11) fine arts students in private secondary schools was used for the study. It was randomly selected by the use of balloting to represent the experimental and the control schools.

2.4 Sample and Sampling Technique:

A sample size of 60 (SS 11) fine arts students in private secondary schools was used for the study. From the 46 private schools that offer fine arts, 21 schools are provided with good arts studios; equipped with 'Donkeys', art materials and media, sizeable classrooms and qualified art teachers. Out of the 21 well-equipped private secondary schools, five schools offer fine arts at the (SS.11) class. From these five schools, which satisfied the above criteria, two were randomly selected by the use of balloting to represent the experimental and the control schools.

A sampled size of 30 (SS.11) fine arts students of one school served as the experimental class and another sampled size of 30 (SS.11) fine arts students of the other school served as the control class, which were selected for use in the study through random assignment, that gave the total of the above sample size, which was used for the study.

2.5 Instrumentation

One research instrument was developed and used for the study. The instrument constituted the Student's Performance Test in fine arts (SPTFA). This researcher designed instrument was used to examine the effect of colour as a design element in the Computer-Aided designed instructional material on wall chart to enhance

students' performance in fine arts. It consisted of 20 multiple choice objective items.

2.6 Reliability of the Instrument

The measure of consistency of SPTFA was established using the test – retest reliability method with a time lag of two weeks. The test of the instrument was carried out in SS. II class of a school, which was not among the schools used for the study. Equivalent study sample of 30 SS. II students of the school was used for the test. The Pearson product moment correlation coefficient was applied on the scores. The essence of the testing was to find out how the respondents would react to the SPTFA instrument. The reliability co-efficient obtained was 0.87; an indication that the reliability of the instrument was high enough to justify the use of the research instrument.

3.0 Development of Instructional Material

3.1 Wall chart: A wall chart was designed by the use of computer graphics, showing the primary, secondary and complementary colours with their functions on a common background of sap green colour. The cool sap green background of the chart was chosen to give rest to the eyes.

The chart conveyed Computer Aided illustrated colours and labeling of the different types of colour on this visually conducive background. These subtle background colours were carefully introduced to reduce the vibrancy of the hues for visual relaxation; therefore, providing contrast to other selected colours used on computer aided illustrations and texts. The background was designed with two flat colours to ensure the effectiveness of contrast, visual arrest, excitement, simplicity and sustained interest.

The design was done through the combined use of CorelDraw and Photoshop computer softwares. It was neatly rendered to give impression of realism to maintain motivational appeal by constantly refreshing the lessons' level of novelty and curiosity as observed by (Surber and Leeder, 1988)

Appropriate lettering styles which include, Arial black, brody D, brush script BT, compacta BIK BT, compacta Bd BT and futura XBIK BT, were selected and applied from the computer. Brilliant red colour was used for major captions for the purpose of emphasis. Black and white are simply neutral colours, which were used for stronger accentuations.

The design of the chart was printed through a colour printer on A3 size art paper, which was made permanent. The chart was used for instructions on the symbolism, the use, and effectiveness of colour as a design element, which was treated in the lesson.

3.2 Instrument Administration:

Two intact classes were required in the two selected private secondary schools. There was an intact class for the experimental group in one school and another intact class for the control in the other school. There was pre-testing for the two groups. The control group was not treated, but the experimental group was treated with the graphics material. The researcher taught and was assisted by two SS.II fine arts teachers in the two schools who distributed and collected all test scripts from the students.

These lessons were taught using computer designed instructional material –wall chart. A double period of 90 minutes lesson on colour as an element of design was given to the students for a period of one week after which questions were asked based on the lesson taught. One lesson was taught for the specified period. The answers to the essay test questions provided the necessary data for analysis.

Pre-testing with 20 multiple questions was carried out on the control and the experimental groups. Post-testing with 20 multiple questions was also carried out on the two groups. Each item of the test scored five marks for each correct answer, which was based on a total score of 100%. These scores were thereafter used in determining the effect of the treatment on students' performances.

3.3 Data Analysis

The data obtained involved the use of descriptive statistics of means, standard deviation and analysis of variance (ANCOVA) in answering the research question and in testing the only research hypothesis.

3.4 Results

Analysis of the effect of utilization of colour in Computer- aided designed instructional material.

Table 1: Means and standard deviation scores of experimental and control groups for utilization of colour as a design element.

| Variables | Experimental Group | | | | | Control Group | | | | | |
|---------------|--------------------|-------|-----------|-------|------|---------------|------|-----------|-------|------|----------------|
| | Pretest | | Post Test | | | Pretest | | Post Test | | | |
| | n | x | SD | x | SD | n | x | SD | x | SD | Post test Gain |
| Use of Colour | 30 | 10.17 | 5.64 | 16.50 | 3.75 | 30 | 6.65 | 3.21 | 10.00 | 3.22 | 6.50 |

The result presented in Table 1 shows that for the utilization of colour; the means of the post test scores for the experimental group was higher than the means of the post test for the control group. This means that, students who were taught utilization of colour using Computer-Aided designed instructional materials performed better than those taught without such materials. The post test achievement gains showed that the gain of the utilization of colour in experimental group is 6.50.

Table 2: Analysis of Covariance of the effect of utilization of Colour in Computer-Aided designed instructional materials on students' academic performance in fine arts in private secondary schools.

| Source of Variance | Sum of square | DF | Mean squares | F | Significance of F |
|--------------------|---------------|----|--------------|--------|-------------------|
| Corrected Model | 742.593 | 2 | 371.297 | 35.352 | .000 |
| Covariate Pretest | 108.843 | 1 | 108.843 | 10.363 | .002 |
| Treatment Effect | 389.980 | 1 | 389.980 | 37.131 | .000 |
| Error | 598.657 | 57 | 10.503 | | |
| Total | 11875.000 | 60 | | | |
| Corrected Total | 1341.250 | 59 | | | |

F- value for colour in CAD instructional material is significant at DF 1,57 at $P < .05$ alpha.

Based on this result, the null hypothesis of no significant effect of the utilization of colour in Computer- Aided designed instructional materials on students' academic performance in fine arts in private secondary schools was rejected, while the alternate hypothesis is retained. Therefore, there is a significant effect of the utilization of colour in Computer-Aided designed instructional materials on students' academic performance in private secondary schools. the result as presented in Table 1, showed that students taught using Computer-Aided designed instructional materials (Experimental group) with a mean of ($x= 16.50$) performed significantly better than those taught without such materials (control group) with a mean of ($x= 10.00$).

This finding supports the findings of Rieber (2000) which states that colour is probably best considered a secondary graphic element in the design of instructional materials, and skaalid (1999) that colour have the potentials to attract attention, develop interest, create a desire for and eventually lead to action. This action culminates in learning, hence, improved performance. Furthermore, this study has confirmed Acker and Klein (1986) assertion that students' preferences and expectation for visuals that differ in the amount of realism in instructional materials through computer graphics may influence the effectiveness more than direct instructional use of this visual characteristic.

4.0 Conclusion

Based on the findings of this study, it is therefore concluded that colour on its high level of significance when used in Computer-Aided designed instructional materials, has a strong visual potentials for the enhancements of students' performance in fine arts, which may be due to its stimulating, exciting and attractive qualities and also its ability to draw attention of learners.

Recommendations

From the findings of this study, the following recommendations are made:

1. The use of Computer graphics should be encouraged in the preparation of instructional materials because of its overall significant effect on the academic performance of students in fine arts in private secondary schools in Akwa Ibom State.
2. Because of the challenges for an improved educational quality at this level the proprietors of private secondary schools in Akwa Ibom State should establish Desktop publishing unit for development of quality Computer-Aided designed Instructional materials for the teaching of fine arts and other subjects as well. In this case professional graphic artists should be recruited in the Desktop publishing units of these schools to develop the print instructional materials, based on their knowledge of proper utilization of the visual elements.
3. Colour as a result of its high effect on the performance of students should be effectively utilized in computer graphic designed instructional materials. This is recommended based on its ability to excite, draw

attention and sustain the learning interest of students.

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