Comparative Effectiveness of Animated Drawings and Selected Instructional Strategies on Students' Performance in Creative Arts in Nigeria

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ABSTRACT

Creative Arts is a core and compulsory subject in Nigerian upper basic classes, but the students' performance over the years indicated high failure. Instructional strategies play a pivotal role in improving students' performance. Computer-based instructions such as animated drawings could be a possible solution. This research adopted the design and development type. The between groups repeated measure design compared pretest and post-test scores of participants to identify differences after treatment. To validate the instruments, test re-test method was used; Pearson product moment correlation co-efficient yielded a reliability value of .94. Also, 674 upper basic school students consisting of 387 public and 287 private schools students, 338 males, and 336 females were involved in the study. Seven research questions and seven corresponding hypotheses were raised and tested respectively. ANOVA and t-test were used for hypotheses testing. Findings of the study showed that computer-based animated drawings instruction enhanced performance. It was recommended among others that the classroom teacher should embrace the strategy for Creative Arts classes; authors and curriculum planners should create more opportunities for computer-based animated drawing in explaining procedures for instruction to enhance learning and improve performance.

Keywords: *Comparative Effectiveness, Animated Drawings, Instructional Strategies, Creative Arts.*

INTRODUCTION

Creative arts is an all-encompassing name used to describe the subject area that includes drama or theater, music, film, drawing, painting, creative writing, graphic design, photography and sculpture, among others (Zimmerman, 2009). Creative arts often defy definition following its varying sections that employ different media as forms of expression. Effort to define creative arts leaves writers simply describing the various constituents obtained in the discipline and ending up with claims that it is a skill employed to produce an aesthetic result (Elliot, 2004). Despite strong evidence for the support of creative arts in the Nigerian curriculum particularly in preparing students to participate effectively as global citizens, not much has been done for its advancement and skill acquisition that could enhance student performance (Ewing, 2010). Student performance in Creative arts over the years indicated much room for improvement. Evidence exists that Creative arts has not been adequately taught in upper basic schools (Enanejor, 2005). Computer-based instructions such as animated drawings are transforming instruction and students' performance, hence might be a solution to the problem. This study filled a gap in the literature by comparing the effectiveness of computer-based animated drawings and two selected instructional strategies on upper basic students' performance in Creative Arts in Nigeria. The purpose of this study was to find out the comparative effectiveness of computer-based animated drawings and selected instructional strategies on upper basic

students' performance in Creative arts. The outcome of this study would benefit stakeholders such as curriculum designers, developers, students and teachers in adapting the modality in Creative arts lessons for upper basic school students to improve performance.

Research Questions

This research sought answers to the following questions:

1. What is the comparative effectiveness of upper basic students' performance in Creative arts on computer-based animated drawing, demonstration and group participation instructional strategies?
2. Is there any difference in upper basic students' performance in Creative arts in public and private schools when they are using computer-based animated drawing instructional strategy?
3. Does gender influence upper basic students' performance in Creative arts when taught using computer-based animated drawing instructional strategy?
4. Is there any difference between upper basic students' performance in Creative arts in public and private schools when taught using demonstration instructional strategy?
5. What is the difference between the performance of male and female Creative arts when they are taught using demonstration instructional strategy?
6. Do upper basic students' performances in Creative arts differ between public and private schools when taught using group participation instructional strategy?
7. Is there any difference between the performance of male and female upper basic students in Creative arts when taught using group participation instructional strategy?

Research Hypotheses

The following hypotheses were tested:

Ho_1: There is no significant difference in the performance of upper basic students taught Creative Arts using computer-based animated drawing, demonstration, and group participation instructional strategies.

Ho_2: Significant difference will not occur between the performance of upper basic students taught Creative arts using computer-based animated drawing instructional strategy in public and private schools.

Ho_3: No significant difference will be obtained between the performance in Creative arts of male and female upper basic students when they are taught using computer-based animated drawing instructional strategy.

Ho_4: There is no significant difference between the performance of upper basic students in Creative arts in public and private schools when they are taught using demonstration instructional strategy.

Ho_5: There is no significant difference noticeable in male and female upper basic students' performance in Creative arts when they are taught using demonstration instructional strategy.

Ho_6: No significant difference will occur between public and private upper basic students' performance in Creative arts when they are taught using group participation instructional strategy.

Ho_7: Significant difference will not result between male and female upper basic students' performance in Creative arts when taught using group participation instructional strategy.

METHODOLOGY

This research adopted the design and development type. The between groups repeated measures design compared scores of participants on pretest and post-test to check differences due to treatment. The learning contents of the computer-based animated instruction package were limited to upper basic 8 (JSS II) Creative arts topics: drawing and painting. The two experimental contents (i) drawing (ii) painting were derived from the topics. The contents require learners' engagement in practical tasks of drawing and making

color application on paintings and designs and have been selected for this study because drawing and painting have been identified as the nucleus of Creative arts engagement in the curriculum (Arthur & Kallen, 2010; Nilson, 2011) and because of students' poor performance in Creative arts in upper basic examinations. Three each of upper basic 8 public and private schools offering Creative arts were engaged for this study, all restricted to the geographical scope of Kabba town, in Kogi State, Nigeria. A total of 674 respondents were involved, consisting of 387 public and 287 private, school upper basic students (314 males and 360 females). Intact upper basic 8 classes were involved, with six class teachers assisting as instructors in the respective classes. The reliability of the instrument used in this study was achieved using test-retest method in an interval of 2 weeks whereby the instruments were administered to 30 Creative arts students in Upper basic class and **Pearson product-moment correlation coefficient** yielded a reliability value of 0.94 in the pilot study. The data obtained were analyzed using descriptive statistics (mean and standard deviation) to answer the seven research questions with their corresponding research hypothesis. Research hypothesis 1 was tested using ANOVA, while research hypotheses 2 to 7 were tested using *t*-test each. These analyses were carried out using SPSS Version 19.

REVIEW OF RELATED LITERATURE

The effectiveness of computer-based animation in education has been pointed out by several authors such as Lih-Juan (2002) and Schnotz and Rasch (2005). By creating a mixture of different learning opportunities, teachers can help students to encounter new information, develop skills, try out ideas, build knowledge and improve on their performance. This is the reason for trying out a variety of instructional strategies especially as they relate to new development in order to give the students added opportunity in employing new discoveries to learn and increase performance (Douglas, 2011). Many instructional strategies provide small windows of opportunity to teach students effectively. Some of the commonest instructional strategies often employed by seasoned art teachers, as indicated by Instructional Strategies Online, by Saskatoon Public Schools (2009), include demonstration and group participation, among others.

The Nigerian National curriculum for upper basic school Creative arts indicates that the purpose was to provide opportunity for students to develop a language for expressing ideas, feelings, emotions and moods through a variety of art experiences (Nigerian Education Research & Development Council, 2007). According to Kafir (2007) the past fifty years has witnessed a gap in the educational achievement of males and females, but which gender has been disadvantaged has fluctuated over the years. In the 1970s and 1980s Nigeria had girls well behind boys in academic performance test scores in science and mathematics, but in the last twenty years the general trend shows girls outperforming boys in academic achievement in terms of class grades across all subjects and college graduation rates, but boys scoring higher on standardized tests.

Animation is a compelling and attractive graphic device, effective in expressing processes, appropriate for explaining concepts and complex systems (Betrancourt & Tversky, 2000). Many studies conducted on animated instructions have indicated varying outcomes. Some research findings on animated instructional strategies indicated positive performance among participants when animation was employed over various formal instructional strategies (Tversky, Morrison, & Bétrancourt, 2002). The observation agrees with several other literature discourse stating empirical observations that animation instructional strategy has potential to increase learning capacity in several fields. Other studies, however, indicated negative outcomes after employing animation instructional strategies, as compared with student performance after employing static graphics. It was observed that animated instructional strategies appeared to have distracted the participants' attention. Where voice accompanied the animation presentations, the participants seemed unable to coordinate the two, and consequently performed poorer (Schnotz & Rasch, 2005). Novices found it difficult and confusing, especially when animation is accompanied with voice direction of activities (ChanLin, 2001).

Elvis (2013) conducted a study to investigate the differential effectiveness of teaching strategies on students' academic performance in South Africa, with a sample of 109 students. Employing three instructional strategies namely, teacher-student interactive strategy, student-centered strategy and teacher-centered approach, and using analysis of variance (ANOVA) on the data, the study revealed that all three strategies improved performance. The teacher-student interactive strategy was the most effective, followed

by the student-centered strategy, and lastly the teacher-centered approach. It is evident that instructional strategies improve students' performance, but with varying effectiveness. According to Marzano (2001) instructional strategies have potential to improve student performance when used appropriately.

The fact that no significant difference is noticed on gender is supported by Onasanya Daramola, and Asuquo (2006) whose assertion was based on the effectiveness of computer-assisted instruction packages employed in getting performance data of Secondary School Students in Introductory Technology in Ilorin, Kwara State, Nigeria. In Introductory Physics, **Kost, Pollock, and Finkelstein** (2009) also discovered that male and female had identical scores in the pre-test and also in the post-test. Hence gender did not indicate any significant difference in terms of performance. Fajola (2000) found that male students taught using computer-assisted instruction performed better than their female counterparts, but Olson (2002) found that female students performed better than male students. Wang, Liu, and Lin (2009), and Ding and Harskamp (2006) found that male students significantly performed better than their female counterparts. According to Peterson and Laudet (2006), when student self-reports are taken into consideration private schools had higher effects than their public counterparts. Goldhaber (1996) examined 3000 students' data in both mathematics and reading, After controlling for the fact that private school students come from affluent backgrounds, he found no achievement advantage in private schools; rather the public and private school students ran at par in performance in the two subjects. Taking into account what the National Association of Independent Schools (2006) called "longitudinal data" that addressed issues of self-report, achievement in high school, civic-mindedness, job satisfaction and educational attainment, the study found that the average private school student outperformed public school students on all of these measures.

The animated drawing was created with the following graphics design software: Adobe Photoshop CS6 and Adobe After effects CS 6. The software is included in the Adobe Creative Suite 6, a collection of design tools created by Adobe Systems, a software company based in the United States of America. Adobe Photoshop is a photo editing and manipulating tool used for adding effects to static images. Some of the animated video elements were edited using Adobe Photoshop. For instance the images of the students that slide in at the end of each lesson were resized and retouched with Adobe Photoshop. It was also used for animating all the transitions seen in the animated video; transparency transitions, the moving pencil, the simulation of drawing, blending in and out of scenes in the animated video were all created with Adobe After-effects CS6. Since the software is a subset of the Adobe Creative Suite 6, they can interoperate with one another thereby facilitating the production process. Files used in Adobe Photoshop can easily be exported using some predefined file formats and then imported into Adobe After-effects without any loss of information in the file. Students can also rely on other resources for instruction on animation. For example, Wikihow shows step by step on how to draw a cube as an animated drawing (How to draw a cube, n.d.), which could be relevant on learning toward this end.

Olumorin (2000) stated that the approach and strategies used in carrying out practical art work could be vital in either teaching or acquiring the appropriate desired knowledge or skill to affect students' performance. The demonstration instructional strategy involves demonstrating by personal example how and what the students are expected to execute in creative art class. It is particularly suitable for studies such as painting and designing.

Heather (2012) claims that the demonstration instructional strategy shows learners how to do a task using sequential instructions aimed at having learners perform the task independently. In the demonstration instructional strategy, the teacher, or some other expert on the topic being taught, is expected to perform the task so that learners will eventually be able to complete the same task independently. The eventual goal is for learners to not only duplicate the task, but to recognize how to problem-solve when unexpected obstacles or problems arise. After performing the demonstration, the teacher's role becomes supporting students in their attempts, providing guidance and feedback, and suggesting alternative approaches.

Harris (2003) refers to Group participation instructional strategy as cooperative learning in which the students are put in small groups to work together. The advantage is that students can work together and learn from one another. Students are often more capable of being in confusion than most instructors often realize, but when they work in groups such tendencies are minimized.

Animation technology has been widely proposed as a major technological advancement that has

potential to support education in all disciplines, especially with its success in television cartoons, advertisements and associated programs. The type of activities supported by this technology promote current educational thinking that students are better able to master, retain and generalize new knowledge when they are actively involved in constructing that knowledge in a hands-on learning environment (Hancock & Dunham, 2005).

The following Figure 1 illustrates how, in this study, drawing and painting will be taught by animated drawings instructional strategy, demonstration instructional strategy and group participation instructional strategy and how the use of these strategies will be studied according to gender and school type.

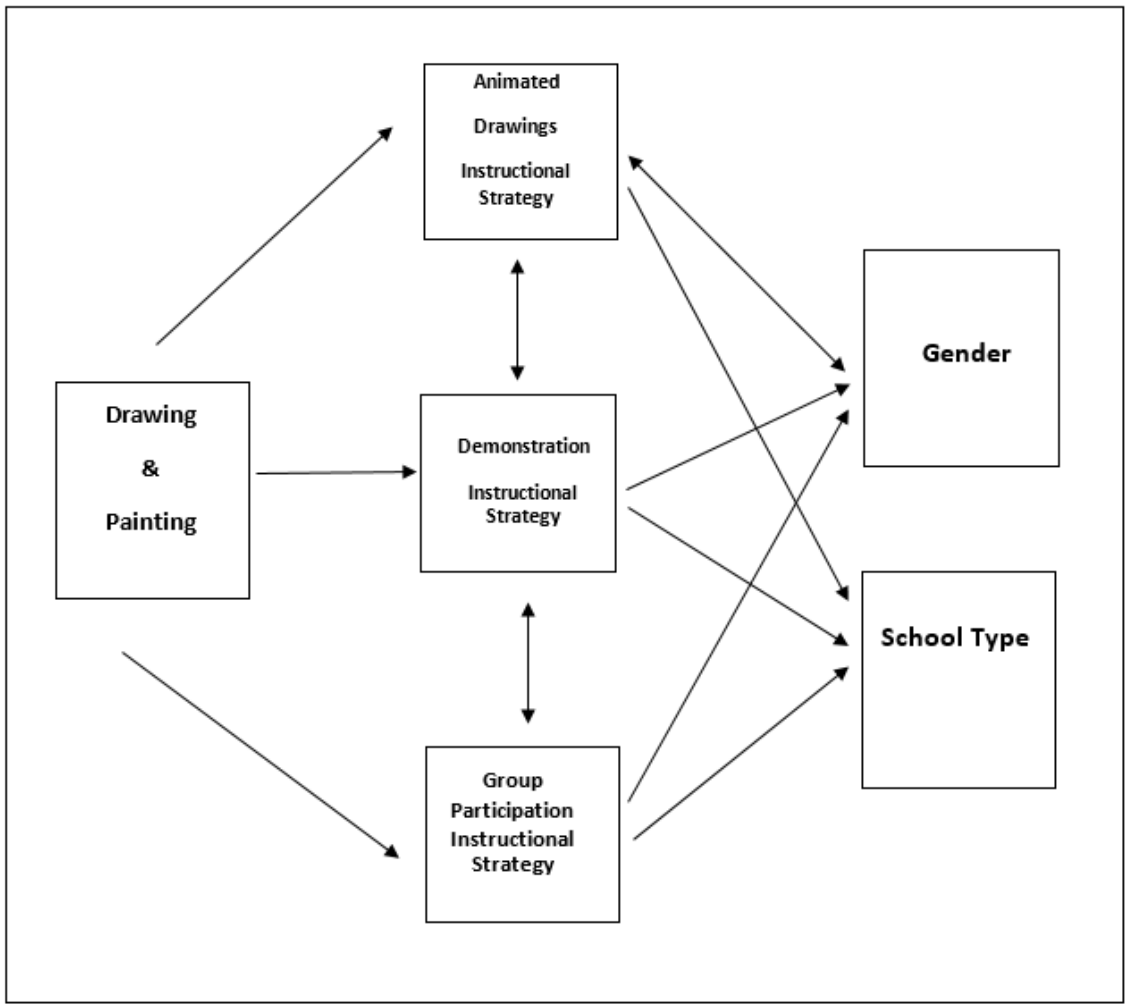

Figure 1. The modality of specification employed in the study.

Hypotheses Testing

To test the hypothesis, ANOVA was used for hypothesis one while *t*-test was employed to test for hypothesis two to seven.

Ho_1: There is no significant difference in the performance of upper basic students taught Creative Arts using computer-based animated drawing, demonstration, and group participation instructional strategies.

Table 2 Mean Scores of Upper Basic Students' Performance by Strategy

Instructional Strategy	Number	Mean Deviation	Standard
Animated Drawings	212	78.42	7.30
Demonstration	198	73.45	7.17
Group Participation	264	61.44	10.26

Note. Number of participants, mean scores and standard deviation between computer-based animated drawings, demonstration and group participation instructional strategies

Table 3 ANOVA Test of Comparative Effectiveness of Strategies

Sources of Variance		Sum of Squares	df	Mean Square	*F*	Sig
Pre-test	Between Groups	4.426	2	4.416	.777	.378
	Within Groups	3819.424	671	5.684		
	Total	3823.840	674			
Post-test	Between Groups	2889.139	2	2889.132	23.473	.000*
	Within Groups	162.915	671	123.084		
	Total	85601.810	674	673		

Note. Students' performance between computer-based animated drawing, demonstration and group participation instructional strategies employed.

Table 2 shows that there was a significant comparative effectiveness of upper basic students' performance in creative art between computer-based animated drawing, demonstration and group participation instructional strategies. The analysis in Table 3 reveals F (2, 671) =0.777, $p > 0.05$ for upper basic students' performance in pre-test scores. The result shows that comparative effectiveness of upper basic students' performance in creative arts between computer-based animated drawing, demonstration and group participation instructional strategies were significant. The post-test scores revealed the comparative effectiveness of the strategies on upper basic students' performance in creative arts F (2,671) = 23.473, $p <$ .05. The mean scores in Table 3 confirmed the comparative effectiveness with computer-based animated drawing being the most effective with the highest mean score of 78.42, the demonstration instructional strategy being more effective with higher mean score of 73.45, while group participation showed the least effectiveness with a mean score of 61.44 for the performance of upper basic students in creative arts. The null hypothesis was thus rejected.

Ho_2: Significant difference will not occur between the performance of upper basic students taught Creative arts using computer-based animated drawing instructional strategy in public and private schools.

Table 4 Mean Scores and t-Test of UBS Performance by School Type with Computer-Based Animated Drawings

School	N	Mean	SD	t	df	Sig (2tailed)
Public	152	77.59	7.61	125.766	151	.000
Private	60	80.53	6.02	103.653	59	.000

Note. Performance between public and private schools students with CBAD employed.

Table 4 shows that there was a significant comparative effectiveness of computer-based animated drawing on upper basic students' performance in creative art between public and private schools. Computer-based animated drawing was effective in both school types with public school, t (151) = 125.766, $p < .05$ and private school t (59) = 103.653, $p < .05$ respectively. However computer-based animated drawing was more effective in the private school for the performance of upper basic students in creative art with a mean score of 80.53 than the public school with a mean score of 77.59. The null hypothesis was therefore rejected.

Ho3: No significant difference will be obtained between the performance in Creative arts of male and female upper basic students when they are taught using computer-based animated drawing instructional strategy.

Table 5 Mean Scores and t-Test of UBS Performance by Gender with CBAD

Gender	N	Mean	SD	t	df	Sig (2tailed)
Male	152	79.87	7.41	110.220	156	.000
Female	60	73.56	6.74	80.970	54	.000

Note. Performance between male and female students with Computer Based Animated Drawing.

Table 5 indicates that there was a significant comparative effectiveness of computer-based animated drawing on upper basic students' performance in creative arts between male [with t (156) = 110.220, $p < .05$] and female [t (54) = 80.970, $p < .05$]. Although computer-based animated drawing was effective for the performance of upper basic students in creative arts, it was more effective for the male upper basic students' performance in creative arts with a higher mean score of 79.87 than for female upper basic students' performance in creative arts with a lower mean score of 73.56. Hence the null hypothesis was rejected.

Ho4: There will not be occurrence of significant difference between the performance of upper basic students in Creative arts in public and private schools when they are taught using demonstration instructional strategy.

Table 6 Mean scores and t-test of UBS performance by school type with Demonstration Instructional Strategy

School	N	Mean	*SD*	*t*	df	Sig (2tailed)
Public	153	73.63	7.08	128.625	152	.000
Private	45	72.82	7.32	66.779	44	.000

Note. Performance between public and private schools students with DIS employed.

Table 6 reveals that demonstration instructional strategy was significantly effective for upper basic students' performance in creative arts in both public and private schools with public school t (152)= 128.625, $p < .05$ and private t (44) = 66.779, $p < .05$ respectively. However the mean scores show that demonstration instructional strategy did not impact any comparative significant difference on its effectiveness for the performance of upper basic students in creative arts between public school with a mean score of 73.63 and private school with a mean score of 72.82. The null hypothesis was therefore accepted.

Ho_5: There is no significant difference noticeable in male and female upper basic students' performance in Creative arts when they are taught using demonstration instructional strategy.

Table 7 Mean Score and t-Test of UBS Performance by Gender with Demonstration Instructional Strategy

Gender	N	Mean	*SD*	*t*	df	Sig (2tailed)
Male	106	73.72	6.92	100.661	105	.000
Female	92	73.14	7.38	95.090	91	.000

Note. Performance between male and female students with DIS employed.

Table 7 shows that demonstration instructional strategy was also significantly effective for the performance of both male and female upper basic students in creative arts with t (105) = 109.661, and t (91) = 95.091, $p < .05$ respectively. However, there was no comparative significant difference on its effectiveness on both male upper basic students with a mean score of 73.72 and female upper basic students, mean score of 73.14. The null hypothesis was also not rejected.

Ho_6: No significant difference will occur between public and private upper basic students' performance in Creative arts when they are taught using group participation instructional strategy.

Table 8 Mean Scores and t-Test of UBS Performance by School Type for Group Participation Strategy

School	N	Mean	*SD*	*t*	df	Sig (2tailed)
Public	82	58.42	9.60	55.090	81	.000
Private	182	62.80	10.2	882.406	181	.000

Note. Performance between public and private schools students with Group Participation employed.

Table 8 reveals that there was a comparative significant effectiveness of group participation on upper basic students' performance in creative arts between public and private schools with t (81) = 55.090, $p < .05$ and t (181) = 82.406, $p < .05$ respectively. The mean score of upper basic students in private school was higher with 62.80 than in public school having a mean score of 58.42. The null hypothesis was thus rejected.

Ho_7: Significant difference will not result between male and female upper basic students' performance in Creative arts when taught using group participation instructional strategy.

Table 9 Mean Score and t-Test of UBS Performance by Gender for Group Participation Strategy

Gender	N	Mean	*SD*	*t*	df	Sig (2tailed)
Male	80	59.00	9.54	55.323	79	.000
Female	184	62.50	10.4	181.468	183	.000

Note. Performance between male and female students with Group Participation employed.

Table 9 shows that group participation was significantly effective for the performance of upper basic students in creative arts with t (79) = 55.323, $p < .05$ and t (183) = 81.468, $p < .05$ for both male and female students respectively. The comparative significant effectiveness of group participation on upper basic students' performance in creative arts shows that the female students performed better with a mean score of 62.50 than their male counterparts with a mean score of 59.00. The hypothesis of no comparative significant effectiveness was therefore rejected.

DISCUSSION

From the findings in this study, the mean scores difference showed that computer-based animated drawing was most effective; demonstration instructional strategy was more effective and group participation was least effective on the performance of upper basic students in creative arts. The finding is in line with the result of Elvis (2013) showing that all engaged instructional strategies enhancing students' performance, which was from research on 109 students in South Africa, using three instructional strategies (teacher-centered, student-centered and teacher-student interactive), and using analysis of variance (ANOVA) for data analysis. The finding also agrees with the assertion of **Marzano (2001)** that instructional strategies used appropriately have potential to improve student achievement across all content areas and all grade levels. The finding is not supported by that of ChanLin (2001) whose assertion was that learners who are not acquainted with animated drawings, especially when it is accompanied with voice direction, find it difficult

to interpret and by consequence may not contribute to improved performance.

The mean scores and *t*-test of upper basic school performance by school type showed that computer-based animated drawing was more effective in private school with the upper basic students having a higher mean score in creative art than the public school students. The finding on the effectiveness of computer-based animated drawing in public and private upper basic schools is in line with the recommendation of Snhnotz and Rasch (2005) that animation is excellent for a learning module; and that in particular, identifying manipulated animations and simulated animations is crucial. It is also in line with Tversky et al. (2000) who stated that research shows positive result for animation impact on learner performance. The better performance of the private over public school is in line with the finding of the National Association of Independent Schools (2005) that addressed issues of self-report, achievement in high school, civic-mindedness, job satisfaction and educational attainment and found that the average private school student outperformed the public school student on all of the measures identified. The finding is also supported by Peterson and Laudet (2006) who found that private school students do better in Mathematics. The finding negates that of ChanLin (2001) who believes novices find interpreting animated drawings difficult, especially when accompanied with voice direction, and thus may not contribute to improved performance. It also negates the findings of Goldhaber (1996) who examined 3000 students' data in both mathematics and reading and found no achievement advantage in either public or private schools.

The mean scores and *t*-test of upper basic students' performance by gender with computer-based animated drawing indicates that computer-based animated drawing was more effective on the performance of upper basic male students in Creative arts than for upper basic female students. The research hypothesis which stated that there is no significant difference in comparative effectiveness of upper basic students' performance in Creative arts between male and female in computer-based animated drawing instructional strategy was rejected; in fact a significant comparative effectiveness of computer-based animated drawing on upper basic students' performance in Creative arts existed between male and female. This finding supported findings by Fajola (2000) who found that male students taught using computer-assisted instruction performed better than their female counterparts. The finding is similarly supported by Ding and Harskamp (2006) who found that male students significantly outperformed female students. However the finding is not in agreement with Olson (2002) who found that female students performed better than male students. Findings of the study are different from those of Onasanya et al. (2006) who identified no significant gender difference in effectiveness of computer-assisted instruction packages in performance of secondary school students in Introductory Technology in Ilorin, Kwara State, Nigeria.

It can be concluded from the study that Computer-based animated drawing is most effective, while demonstration instructional strategy was more effective and group participation less effective. Computer-based animated drawing was more effective for upper basic students in private school for their performance in creative art. Computer-based animated drawing instructional strategy was more effective for male upper basic students than for their female counterparts, while demonstration instructional strategy showed equal effectiveness on upper basic students' performance in Creative Arts in both public and private schools. Demonstration instructional strategy did not discriminate between male upper basic students' performance and female upper basic students' performance in Creative Arts. Group participation instructional strategy was more effective on upper basic students' performance in Creative Arts in private schools than in public schools. Group participation instructional strategy was more effective on performance of upper basic female students than for upper basic male students.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. The classroom teacher should embrace computer-based animated drawing instructional strategy for creative arts painting classes in upper basic schools.
2. Creative arts authors and curriculum planners should give more places for computer-based animated drawing in explaining procedures, especially in painting, in instructing the students which could give better learning opportunity and improved performance by implication. This was underscored by the fact that images presented students with the ease of learning lacking in the other instructional strategies. There might not be a replacement for good examples, and surely, animated drawing instructional strategy provided one.
3. Animated drawing packages could be developed for teacher and student usage.
4. Creative arts teachers should endeavor to develop students' competence in using technological applications, such as computer-based animated drawing, that are meant for learning. This will further increase their knowledge of new research and innovations in computer-based instructional strategies.
5. Students could equally endeavor to explore the opportunities offered by computer-based animated drawing packages for improving their individual learning and revision.
6. Government and appropriate school authorities could equally embrace and support the use of computer-based animated drawing strategy in schools as this would improve students' performance in creative arts.
7. The teachers need to be trained in computer based innovation and be always updated on new developments in instructional technology.

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