NIU Journal of Humanities Copyright©2023
Nexus International University ISSN: *3007-1704*; 8(4): 163–169

The Impact of Information and Communication Technology on the Academic Achievement of Creative Art Students in Secondary Schools

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Abstract. This study assessed the effects ICT tools on academic performance of creative arts students in selected Nigerian secondary schools in Ondo state. The study adopted pre-test post-test quasi experimental research design. One hundred and sixty (160) creative arts students were purposively selected from four schools in Akure south local government area of Ondo state based on gender and academic track records. The selected students were divided into two groups; the control group and the experimental group. One objective and two research hypotheses were generated for the study. Data was gathered from both primary and secondary sources. A set of teacher made text and ICT Instructional Packages such as instructional videos were used for data collection. Experimental group was taught using ICT Instructional packages while the control group were exposed to conventional method of teaching. The schools were selected based on the availability of ICT gadgets and access to power supply. The study revealed that students taught with the ICT Instructional packages performed significantly better than those taught using conventional teaching method. The data collected was analyzed using descriptive and inferential statistics. Independent sample t-test was used to test the hypotheses. The result also shows that the use of ICT based Instructional packages in teaching creative arts is not significantly affected by the gender of the students. It was therefore recommended that the application of ICT-based instructional strategy should be encouraged as an effective tool for teaching and learning in secondary schools in Nigeria. The government and private directors of schools are also encouraged to provide more ICT gadgets to schools in order to make teaching and learning more effective.

Keywords: ICT, Art, Design, Secondary school and Academic performance.

1. Introduction

Information and Communication Technology (ICT) is a field of study with a technological foundation that handles information and data for social, cultural, and educational objectives. As a result, ICT in education may aid in effective educational planning and growth for both instructors and students (Manichander, 2016). Tools for information and communication technology such the internet and gadgets such laptops, scanners and printers are often utilized in a variety of industries, including business, security, healthcare, and education. The adoption of ICT in education is typically thought to improve educational quality and transform teacher-dominated classrooms into ones that are more participatory and engaging. As a result, the kids will learn more effectively and be able to grow in their capacity for creativity, problem-solving, logical thinking, and communication (Khan, 2015).

ICT has aided in the modernization of teaching techniques, the learning environment, and the roles and responsibilities of instructors and students throughout the teaching and learning process (UNESCO, 2002; Andoh, 2012). It is nearly hard to imagine teaching and learning circumstances without the support of information and communication technology since ICT tools are effective and crucial

tools for providing educational services such as teaching, assessment of students and educational record keeping. The teaching methods of design and art has relatively changed as a result of the usage of ICT. For instance, Adeloye (2021) observed that instructional videos are now very resourceful teaching aids for art and design. When teachers utilize ICT to teach or complement their teaching, it has given pupils a variety of learning strategies and allowed them to maximize their learning potential.

Information and communication technology enables students to study and practice at their own speed and with greater creativity and reflection. The ability to learn and perform art digitally through instructional videos and other ICT instructional packages also cuts down the time and location barriers in education. Although this relies on the teacher's instructional goal, the students' levels of absorption, instructional demands, and the availability of resources. ICT tools assist art and design students in mastering skills more effectively and quickly. Through simulations of actual learning settings, ICT aids in the simplification of difficult skills and activities. Information and communication technology (ICT) enables dynamic learning and teaching that improves the study of art and design at all educational levels (Adeloye, 2021).

The aim of this study is to examine the impact of employing ICT tools to teach art on secondary school students' academic performance in the creative arts while determining the impact of teaching the arts using ICT tools on secondary school students' academic performance in the creative arts is the study's objective. Art and Design is assumed to be a subject that only the naturally artistically talented students thrive but Adeloye (2021) noted that teaching method and tools greatly influence teaching outcomes. This necessitated the need to assess the influence of teaching using ICT tools on the academic performance of art students.
The following null hypotheses were formulated to guide the study:

- There is no significant difference in the level of academic performance of students taught creative arts using ICT tools and those taught using conventional method of teaching.
- There is no significant difference in the academic performance of male and female students taught creative arts using ICT tools.

2. Literature Review

2.1 Synergy between ICT and Education

In order to adapt to the quick changes in modern methods of doing things, ICT has a vital role to play in the economies of most countries throughout the world. ICT has grown so much recently that underdeveloped nations are still having trouble keeping up with the latest trends and technological revolution. Information and communication technology serves as the foundation for development in the twenty-first century, therefore a thorough knowledge of this concept and its practical implementation are seen as essential components of educational growth (UNESCO, 2002).

According to Andoh (2012), educational institutions employ ICT to help students acquire the information and practical skills they need to survive in the twenty-first century. Information and communication technology improves educational equity, virtual and high-quality teaching and learning programs are broadcast, teachers' professional development is facilitated, and an improved and efficient educational management system is attained. The three main concerns of education; access, equity, and quality, may thus be easily addressed using ICT. Information communication technology (ICT) facilitates learning by promoting programed instruction, delayed time discussion, self-learning, directed instruction, data seeking, self-learning, critical thinking, and analysis. (Yuen, Law, and Wong, 2003). ICT also facilitates learning by lowering barriers to access to quality and relevant education. ICT use has the potential to improve educational administration, learning outcomes, and access and quality of instruction for underprivileged students (Sharma, 2003).

The methods of educational research are also favorably impacted by information and communication technology (Yusuf, 2005). ICT is used in education because technology gives students and teachers the ability to operate, manipulate, save, and retrieve data, which tends to encourage self-paced and active learning (Ali, Haolader, and Muhammad, 2013). Expanded collaborative learning between teachers and students, both inside and outside the classroom, is made possible by ICT-based learning.

The internet, computers and computer software help to connect students outside the physical classroom environment. Students now learn in small groups in online forums such as the Virtual Math Teams environment (Gerry, Carolyn, Kate & Authur, 2010).

Gerry et al (2010) noted that software agents can be used to ensure synchronous interactions with small groups of students working on online learning forums. Barrett (2008) noted that computer supported teaching and learning activity is vast and applicable in many disciplines. Some of the common platform used for are zoom and Microsoft teams among others. This engaging and participatory learning process differs from the conventional learning process in that online learning programs encourage teachers and students to continue studying course materials after school. The system aids teachers in lesson planning, lesson design, and preparation of teaching materials such lesson notes and lesson plans (Ali, Haolader, and Muhammad, 2013). Since new technology innovation in education has necessitated a re-examination of new strategies and tools in instructional process, the quick growth of ICT-based teaching method has spurred a revolution in learning.

2.2 Information Communication Technology and Art Education

The education system of every nation must include the teaching of art and culture. Creative art education should be respected and viewed as a field of literacy, not merely a topic (Илић, 2015). Visual art should be incorporated into more topic areas, just as it is with other subjects in the literacy field, because visual communication is a key means of communication in this day and age. For students to achieve good achievement in their academic, professional, and personal lives. It's crucial for learners to have the artistic and design abilities necessary in this digital age if they want to succeed in school, in career, and in their personal lives (Илић, 2015). Adeloye (2021) pointed up the importance of ICT in the teaching of art and design. He noticed that using ICT tools improves the efficiency and effectiveness of teaching art to both male and female pupils. ICT technologies have the potential to enhance access to science education, vocational education, and art education (Tinio, 2002). The capacity of ICT to transcend time and location limitations is one of its key features. For example, there are functional online course modules available seven days a week for a variety of art courses.

ICT-based educational delivery, like art education programs broadcast on television or radio, downplays the importance of students and teachers physically coming together to study. It is also important to keep in mind that some ICT tools and technologies, like teleconferencing, allow all active learners spread across various places to learn at the same time. Less reliance is now placed on printed books, in-person demonstrations of art concepts in studios, and other tangible teaching resources in libraries by educational institutions. These physical textbooks and instructional materials are few and insufficient to fully satisfy the practical requirements of art students. A wealth of learning resources in the arts and across many media and platforms are now easily accessible from anywhere and at any time by an infinite number of people thanks to information and communication technology. Some of these resources are free, while others require learners to sign up before they can access them. Carpenter and Taylor (2003) assert that information and communication technologies have significantly improved access to peers, scholars, and professionals in the field of art worldwide. ICT resources are few and insufficient in most poor countries' schools, and they are even scarce in some rich nations.

A crucial concern, especially in light of the current educational climate, is expanding access to high-quality art education and training. By increasing students' interest and engagement, accelerating the acquisition of foundational skills, and improving teacher preparation, ICT-based education improves the quality of art education and training (Carpenter and Taylor, 2003). When utilized properly, ICT technologies improve a learner-centered environment. ICT tools like instructional films and multimedia software may be utilized to create real, approachable content that will keep students interested in both academic and practical learning processes (Chesher, 2004).

2.3 Classification of ICT Applications for Art Education

ICT applications come in a variety of forms that can be applied to art instruction (Adeloye, 2021). The following areas in art education have seen computer use: Computer Assisted Learning (CAL), Computer Aided Instruction (CAI), Computer Based Education (CBE), Computer Enriched Instruction (CEI), Computer Managed Instruction (CMI). However, Computer Assisted Instruction (CAI) is the most relevant in Nigerian schools.

2.4 Computer Assisted Instruction

Chimezie (1998) described Computer Assisted Education (CAI) as a teaching method where the computer is directly used to offer instruction in an interactive way in order to provide and manage the unique learning environment for each individual learner. Computer Assisted Instruction, according to Audu and Agbo (2010), is an interactive teaching

method in which the instructional material is presented by a computer, which also tracks how much is being learned. To accomplish certain educational objectives, CAI use a combination of text, images, sound, and video in the learning process. Drill and Practice, Tutorials-Simulation Mode, Educational Games, and Demonstration utilizing audio-visual resources are just a few of the several strategies used in Computer Assisted Instruction that use computers.

2.5 Impact of ICT on Students' Academic Performance

Knowledge is the driving force behind the Information and Communication Technology era. In order to keep up with the global technology trend in education, this encourages education systems in developing nations to make strategic investments in teaching and learning techniques by implementing ICT platforms for teaching and learning (Mbaeze, Ukwandu and Anudu, 2010). More specifically, there has been a lot of interest in how ICT tools and resources may complement teaching techniques in order to increase student desire for learning and assess its impact on their academic achievement. Based on the characteristics of students and teachers, studies on the use of ICT tools and resources in social science courses show that using ICT in teaching has both direct and indirect impacts on learning (Mbaeze, Ukwandu and Anudu, 2010).

Ben-Youssef and Dahmani (2010) found a range of outcomes on how ICT affects students' academic performance. After accounting for the characteristics of the students and selection bias, Coates and Humphreys (2004) contrasted the usage of traditional teaching techniques with online teaching methods. It was shown that pupils who were instructed traditionally scored 15% higher than those who were instructed online. However, a database of basic Economics sections was created by Sosin, Blecha, Agrawal, Bartlett, and Daniel (2004) using a sample of 3,986 students taught by 30 professors in 15 schools at the United States of America during the spring and autumn semesters of 2002. The usage of ICT has a considerable, if modest, positive influence on students' performance. They also demonstrate that while certain ICT tools appear to have a favorable correlation with performance, others do not.

3. Research Methodology

3.1 Research Design

The study adopted pretest – posttest quasi experimental research design. A pretest-posttest design is an experimental design where measurements are taken before and after a treatment. This design enables the researcher to see the effect of some type of treatment on the group ("Experimental design", n.d). It is usually a quasi-experiment where participants are not randomly assigned ("pretest-posttest design", 2022).

3.2 Research population

The population of the study comprised of secondary school students in Akure south local government area of Ondo state. This comprises of secondary students from public secondary schools in Akure south local government.

3.3 Sample size

A sample size of 160 students was drawn from 4 secondary schools in Akure south local government. 40 students each were randomly selected from the four schools making the total of 160 participants. This number was selected because the average number of students per class in the selected schools is 40. The participants were divided equally into two groups; the control group and the experimental group based on their academic track record and gender

3.4 Data Collection Tools

Teacher made Test in Creative Arts and ICT Instructional Package were used as data collection instruments. To ensure face and content validity of the instruments, they were given to two (2) seasoned Art educators for necessary correction. It was recommended that the test contents should be simplified to avoid grammatical misinterpretation by the students. The reliability of the instruments were obtained using Kuder-Richardson 21 (KR 21). The reliability coefficient 0.87 was obtained which was considered to be high enough for the instrument to be used. The data collected were analyzed using t-test as the inferential statistical tool to test the research hypotheses.

3.5 Research Approach

The research population was divided into experimental and control groups. The experimental group was taught using ICT packages such as

instructional videos while the control group was taught using the convention classroom teaching method using physical teaching aids. The two groups were assessed using teacher made test in creative arts. The results from both groups were collected and analyzed using t-test to test the hypotheses.

4. Data Analysis and Discussion

The scores of student in the experimental and control groups were used to test the stated hypotheses. Table 1 shows the raw scores of the students in both groups.

Table 1: Table showing scores of the experimental and control groups

Groups		Scores																				
E	M	73	65	70	70	80	84	90	73	71	64	50	88	78	49	53	90	89	81	88	56
	F	71	68	75	55	85	44	88	81	66	70	50	73	88	89	80	76	70	74	78	80
C	M	66	70	78	50	55	48	68	53	60	80	61	52	44	40	40	56	55	57	58	42
	F	40	56	54	54	40	42	40	42	55	60	81	58	52	66	50	55	51	76	71	65

Keys: E= Experimental, C= Control, M= Male, F= Female

Hypothesis 1: There is no significant difference in the level of performance of students taught creative arts using ICT tools and those taught using conventional method of teaching.

This hypothesis was tested by comparing the mean scores of student taught using ICT instructional tools and those taught using the conventional method. Table 2 shows the mean comparison ant t-test result.

Table 2: Independent samples t-test on academic achievement of students taught using ICT tools and those taught using conventional method

Status in the Experiment	N	Mean	Standard Deviation	Standard Error Mean	T-value	DF	P-value	Mean Difference
Experimental	80	73.08	12.75	2.02	5.78	78.00	0.00	16.43
Control	80	56.65	12.67	2.00	5.78	8.00	0.00	16.43

The result showed that the students in the experimental group have a mean score of 73.08 ($\bar{X} = 73.08$) while students in the control group have a mean score of 56.65 ($\bar{X} = 56.65$). The mean difference of the scores of the two groups is 16.43, this shows that the students in the experimental group faired better compared to those in the control group and suggests that there is significant difference in the performance of students in the experimental group and those in the control group. The result also indicated that the P-value < 0.001. This confirms significant difference in the means of the two groups. The implication here is that the use of ICT in the teaching of Creative Art has the propensity of improving academic performance of students and the difference in the performance of students in the control and experimental group is not an accident. Hence, null hypothesis that states: There is no significant difference in the level of performance of students taught creative arts using ICT tools and those taught using conventional method of teaching is hereby rejected.

Hypothesis 2: There is no significant difference in the performance of male and female students taught creative arts using ICT tools.

Table 3: Independent samples t-test on mean performance scores of male and female students taught creative arts using ICT

Sex	N	Mean	Standard Deviation	Standard Error Mean	T-value	DF	P-value	Mean Difference
Male	20	73.10	13.58	3.04	0.12	38.00	0.99	0.05
Female	20	73.05	12.23	2.74	0.12	37.60	0.99	0.05

This hypothesis was tested using the result of only students in the experimental group. The result showed that the male students have a mean score of 73.10 ($\bar{X} = 73.10$) while female students have a mean score of 73.05 ($\bar{X} = 73.05$). The difference in the mean scores of the male and female students is 0.05. This shows similarity in the scores of the two groups and suggested that there is no significant difference in the academic achievement of male and female students taught using ICT tools. The analysis also shows that the p-value = 0.855. Since the p-value > 0.05, it is safe to affirm that there is no significant difference in the academic achievement of male and female students taught using ICT tools. Therefore, the null hypothesis which states that there is no significant difference in the performance of male and female students taught creative arts using ICT tools is hereby not rejected. The implication is that the effect of teaching using ICT tools in enhancing academic achievement of students is not gender biased.

5. Discussion on the Findings

The findings of the data analysis showed that, for both male and female students, the application of information communication technology in the classroom is much preferable than the traditional teaching approach. The first hypothesis compared the academic performance of the students who were exposed to the Computer Assisted Instructions (CAI) with those who were in the control group who were taught using conventional techniques in order to investigate the impact of teaching creative arts using ICT tools. The results of this study unmistakably showed that using ICT tools has a better effect on students' academic performance in art than using the traditional approach. The results are consistent with those of Nwike and Chukwudum (2011), who claimed that Computer Assisted Training (CAI), a derivative of computer technology, is a very efficient way to offer instruction.

The second hypothesis examined how the usage of ICT tools affected the academic achievement of male and female students studying the creative arts. The results of the test, which utilized an independent samples t-test, showed no significant differences between the genders of the students who took part in the teaching process's usage of computer-assisted instruction. It was noted that both male and female research participants' performances were affected by ICT to a similar extent. This result is consistent with research on the use of CAI by Abdu-Raheem (2012), which showed that there is no significant difference in the mean achievement scores of male and female students in either the experimental or control groups in subjects like mathematics, history, and physics.

6. Summary and Recommendations

Information and communication technology (ICT) has a significant role to play in the secondary school teaching and learning of creative arts, according to the study. The academic performance of pupils is significantly impacted by the employment of ICT technologies in the creative art classroom. Therefore, it can be concluded that computer assisted instruction outperformed the traditional teaching approach now employed in the majority of institutions. When compared to the traditional form of education, the use of computer assisted instruction improved the development of autonomous learning abilities among students of creative arts. This will foster an attitude of independent study. The students in the experimental group had access to instructional videos. This enabled them to study and practice independently at their own pace.

Additionally, it was shown that the use of computer-assisted instruction makes it possible for students of any gender to compete favorably in the academic arena, independent of gender disparities. The use of computer-assisted instruction successfully lowers the gender gap in students' rates of developing autonomous learning skills, which is occasionally seen between male and female students.

The results of the investigation have led to the following recommendations.

- For Nigerian secondary school pupils, there is a need for proper supply of ICT-driven educational tools including interactive whiteboards, internet connectivity, and instructional films, among others.
- Teachers should be motivated to grow themselves and increase their skills in using ICT for learning and growth.

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