

EFFECTS OF ARTIFICIAL INTELLIGENCE ON COLLEGES OF EDUCATION STUDENTS' PERFORMANCE IN GRAPHIC DESIGN IN SOUTH-WEST, NIGERIA

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Abstract

Students learn at their own space with support of artificial intelligence. Learning systems tailor lessons to individual student's need. This investigation examined effects of Artificial Intelligence (AI) on students' performance in Graphic Design of Colleges of Education (COE) in South-western Nigeria. The research employed a quasi-experimental research. The study population comprised all Fine and Applied Arts (FAA) pre-service teachers in six federal COE in South-west, Nigeria. Random sampling procedure was employed in selecting an intact class of 200 level 38 FAA students from Federal COE (Technical,) Akoka, Lagos State, Nigeria as the experimental group and 36 FAA students in Federal COE (Special), Oyo, Oyo State, Nigeria into control group as sample size of the study. Artificial intelligence package (AIP) is the only instructional tool for the treatment in the experimental group, while data were gathered through Graphic Achievement Test (GAT), Graphic Skill Test (GST) and Graphic "on the Spot" Skill Assessment Instrument (GOSAI). Nine specialists certified the instruments and tested reliability using Crombach Alpha with reliability indexes of 0.84, 0.88 and 0.76. Research questions one to five were answered with the use of Mean scores and Standard Deviation, independent sampled t-test utilised to test the hypotheses one and two, while hypotheses three to five were analysed with the use of ANCOVA. The outcome showed that there was a difference in the experimental mean score and control group mean of FAA learners in graphic design in COE. Therefore, recommendations that lecturers in COE should try to embrace and employ AIP for teaching Graphic Design in COE.

Keywords: Artificial Intelligence, Graphic Design, South-west Zone, students' performance

Introduction

Artificial intelligence is a concept on the advancement of computer schemes aiming to perform significant tasks that traditionally essential for human intellect like recognising language use, decision making and recognising configurations. Artificial intelligence is a head-word concept that incorporates a complex diversity of technologies, like natural language processing, machine learning and deep learning. The technology known as artificial intelligence permits computers

and other devices to imitate problem-solving, decision-making, human learning, comprehension, creativity and autonomy (Stryker & Kavlakoglu, 2025).

Coursera (2025) asserted that machine learning simulations, which enable computer systems to carry out tasks like recommending songs, figuring out the quickest route to an endpoint, or text translation between languages, are created using algorithms trained on data sets. The following are common samples of artificial intelligence in use nowadays: Deep learning algorithms are used by Google Translate to decode text between languages, ChatGPT makes use of huge language prototypes to produce text in response to queries or comments, Netflix uses machine learning algorithms to build user-friendly recommendation engines based on viewing history, and Apple's Siri: Apple's voice-activated personal assistant, Siri, can interact with users and carry out their requests thanks to deep neural networks.

According to Negoita and Popescu (2023), artificial intelligence has emerged as a revolutionary force in a number of industries, and its potential influence on education is becoming more and more apparent. The current innovations in technology are changing the world and a significant shift in education is on the horizon. This introduction examines the evolving field of artificial intelligence in learning, highlighting the ramifications for both students and teachers as well as the major factors that have contributed to its increasing significance. In recent years, artificial intelligence has greatly improved learning, offering innovative solutions that transcend conventional teaching techniques. Artificial intelligence is being used in educational settings with the goal of revolutionizing traditional pedagogical approaches to make learning more flexible, personalized and efficient. The use of AI-driven technology in education has many advantages, although there are also serious issues with its equity, ethical application and the responsibility of learners in the future.

The implications of artificial intelligence in several disciplines are growing in a time of tremendous technology breakthroughs and societal changes. This change is especially important in the educational setting since it can alter how educators and learners engage in learning activities and enhance the depth and quality of knowledge (Negoita & Popescu, 2023). Information technologies, especially artificial intelligence, are transforming contemporary education, according to Wang et al. (2024). In order to facilitate a range of teaching and learning activities, learning management and training systems now mainly rely on educational robots and artificial intelligence algorithms.

Artificial intelligence has been used in education in a variety of ways. For example, Khan Academy offers Khanmigo, an artificial intelligence tutor which employs GPT-4 skills to run insightful criticism and customised learning assistance across a range of subjects like programming, mathematics, and language acquisition. In a similar vein, advanced artificial intelligence technologies are employed by a language learning platform to enhance student experiences. Intelligent evaluation methods intended for various grades scenarios like the qualified entrance examinations are available from iFlyTek. Learning management systems that are powered by artificial intelligence, like Absorb LMS and Docebo, provide a range of AI structures to assist with instructional programmes. These features include intelligent quotient (IQ) generation, administrative work automation, and personalized learning. The Nao and Pepper robots from SoftBank Robotics are made to be social robots that can teach languages.

Artificial intelligence's quick development is changing several industries, including education. By providing a series of possibilities and challenges, AI has a substantial influence on academic growth of learners in both specific and general education (Edtech, 2020). Artificial intelligence has the ability to revolutionize education (Holmes et al., 2019) and address students' diverse needs, from personalized learning experiences to intelligent tutoring programs that provide tailored advice, assistance, and feedback based on each student's unique learning style and degree of expertise (Hwang et al., 2020). However, as noted by Castaneda & Selwyn (2018), the use of cutting-edge artificial intelligence technologies in isolation does not guarantee fruitful learning outcomes.

Jarrahi (2018) expressed that numerous industries, including graphic design, have been altered by the integration of artificial intelligence. AI is more capable than technology, which is known to boost productivity. Because artificial intelligence can reason, learn, and mimic human cognitive capacities, it differs from other general technologies in that it can, in a sense, carry out activities on its own (Dwivedi et al, 2021; Mirbabaie et al, 2022). The job of practitioners has been impacted by this technology, which has shown beneficial at different phases of a general design process in this area (Guo et al, 2021; Arias-Rosales, 2022;). For example, one researcher developed Shapi (Arias-Rosales, 2022), an artificial intelligence tool that allows a user to create many versions of a freehand sketch. The user can then add emphasis points to the system-provided sketches to continue diverging.

Guo et al. (2021) stated that Vinci, another example of an artificial intelligence, deals with pictorial design system that generates advertisement posters by using product images and taglines. In so far as the Vinci system can create posters just as well as a human designer on its own, users are able to modify the generated posters (Guo et al., 2021). Artificial intelligence makes it possible for non-artists to produce digital art with publicly accessible text-to-image services such as Midjourney (midjourney.com), DALL-E (openai.com/dall-e-2), Diffusion Bee (diffusionbee.com), and Dream Studio (dreamstudio.ai) (Lyu et al, 2022). While artificial intelligence has shown its usefulness in graphic design (Liu et al, 2021; Huang & Zheng, 2022), less is known about its potential utility in higher level graphic design courses. Nevertheless, research on artificial intelligence has been conducted in higher education (Cavalcanti et al, 2021, Mousavinasab et al, 2021) and graphic design (Liu et al, 2021), (Huang & Zheng, 2022), few studies have examined how artificial intelligence can be used in higher education to improve students' graphic design course learning.

More so, cheating in examination is made possible by artificial intelligence's ability to generate human-like writing that evades plagiarism detection tools (Hellerstedt, 2023). The question of whether artificial intelligence can generate reliable information has also surfaced (Tlili et al, 2023). For example, studies have found that ChatGPT can produce both accurate and entirely misleading information, which is known as "artificial hallucinations" (Alkaissi & McFarlane, 2023). Although text-based content has been the focus of an increasing amount of artificial intelligence research, it is equally pertinent to look at how AI can be used to visual learning tasks, such as those in graphic design classes.

A key component of design art, graphic design makes use of various visual components such letters, lines, figures, and colors. The goal of mixing different artistic components and visual features with layout design, text design, and graphic design is to provide a visual impression that successfully communicates an intended message (Liu, 2021). Generally speaking, graphic design courses help students develop an awareness of how to integrate and illustrate visual elements in a particular setting. One such assignment is to investigate various components and then talk about the connections and interactions among typographic signs (Dziobczewski, 2018; Jackson, 2018). Students can experiment with various graphic elements and come up with a feasible proposal that matches a job by designing a poster with a theme. Students can experiment with various methods and express themselves creatively with the help

of this kind of homework. However, it can be difficult for pupils who don't have any prior graphic design experience.

By doing new things and gaining experience from an assignment, students learn more than they did before (Jackson, 2018). According to earlier findings, AI can help designers with their daily job and expedite time-consuming procedures (Dwivedi et al., 2021). Many designers lack a clear knowledge of how to include artificial intelligence into a design process, even if it can assist in producing numerous designs and sketches (Yang et al., 2018). In order to free up time for more creative assignments, higher education can equip students to automate some monotonous work by implementing artificial intelligence. This research also focused on gender and ability level.

Gender has a significant function in the whole discussion of Artificial Intelligence and many scholars have explored the relationships that may exist between gender and AI. For instance, Madu (2011) worked on correlation between gender of students and Arts-related subjects academic performance. The findings revealed that females outperformed their males counterparts in arts-related subjects. Onyebuchi-Igbokwe et al (2024) investigated the influence of gender on students' academic performance in Graphic Design in tertiary institutions in Owerri Imo State: The case of Imo State University, Owerri and Federal Polytechnic Nekede. The result displayed that when taken into account separately, gender is a demographic factor that has little bearing on learners' intellectual achievement especially in Graphic Design in tertiary institutions.

MevlütÜnaAlp (2024) investigated the visual perception and attitudes of secondary school students' towards Graphic Design. The outcome showed that visual perceptions of participating learners were found to be at the high ability level. Also their attitudes towards graphic design were found to be at a high level. Clemente-suaraz et al (2024) worked on comparison of the intellectual, behavioural, and psycho-physiological characteristics of male and female vocational training learners. The results indicated that no statistically significant variations exist in extraversion or openness to new experiences. Nevertheless, there were notable disparities when it came to agreeableness, with female students scoring higher than their male counterparts. Additionally, it was discovered that there were notable gender variations in conscientiousness and neuroticism, with female students scoring higher than male students. In terms of academic achievement, ladies performed better than their male counterparts.

Statement of the Problem

Higher education is one of the new areas where artificial intelligence has drawn more attention. It is anticipated that the artificial intelligence package would revolutionize teaching and learning in educational institutions by producing a variety of content design, creativity, text, and code. Students can benefit from this shift by studying at their own pace and receiving guidance along the way, which may also boost their self-esteem. Kushiator et al (2023) worked on digital media practices: examining the difficulties faced senior high school graphic design students in Ghana. The result revealed that many of the students in graphic design confirmed that their school did not provide them enough ICT instructions. However, researchers focused on tasks of graphic design students in senior higher school. But not focus on effect of artificial intelligence on colleges of education students' performance in graphic design.

Over the years, it has been noted that fine arts students do the majority of their practical work in the studio using just the conventional approach. Therefore, it is imperative to look into these aspects since they have a detrimental impact on College of Education graphic design students' ability to become digitally literate in the twenty-first century. This is due to the fact that deliberate adaptation of digital instructional models in learning establishments contributes to great advancement of digitally knowledgeable learners who can creatively and comfortably activate in a technology-enabled atmospheres in all areas of their specialization. Hennekeuser et al. (2024) affirmed that vital issues about accessibility, equity and the changing mode of traditional instructional strategies are taking up using AI in in learning environment. Artificial intelligence has a thoughtful and wide-ranging effect on education. By customising instructional resources to every learner precise needs, AI provides personalised learning potential. Hence, the rationale behind carrying out research on effect of artificial intelligence on Graphic Design in the performance of students in Colleges of Education in South-west, Nigeria.

Purpose of the Study

This study explored the effect of artificial intelligence on the performance of students in graphic design in Colleges of Education in South-west, Nigeria. Precisely, the study intended to:

1. examine the effect of artificial intelligence package on the performance of Fine Arts students in Graphic Design.
2. find out the influence of gender on the performance of Fine Arts students in Graphic Design.

3. assess the effect of ability level on on the performance of Fine Arts students in Graphic Design.
4. determine the interactive effect of treatment and' gender on the performance of Fine Arts students in Graphic Design.
5. ascertain the interactive effect of treatment and students' ability levels on their performance in Graphic Design.

Research Questions

The following questions were addressed in this study:

1. What is the effect of artificial intelligence package on the performance of Fine Arts students in Graphic Design?
2. What is the effect of gender on the performance of Fine Arts students in Graphic Design?
3. What is the effect of ability levels on the performance of Fine Arts students in Graphic Design?
4. What is the interaction effect of treatment and gender on the performance of Fine Arts students in Graphic Design?
5. What is the interaction effect of treatment and ability levels on the performance of Fine Arts students in Graphic Design?

Research Hypotheses

The research hypotheses were developed and examined at 0.05 level of significance.

- H₀₁:** There is no significant difference between experimental and control groups mean score performance of Fine Arts students in Graphic Design.
- H₀₂:** There is no significant difference between male and female mean score performance of Fine Arts students in Graphic Design.
- H₀₃:** There is no significant difference among high, medium and low ability levels mean score performance of Fine Arts students in Graphic Design.
- H₀₄:** There is no significant interactive effect of treatment and gender on the mean score performance of Fine Arts students in Graphic Design.
- H₀₅:** There is no significant interactive effect of treatment and ability levels on the mean score performance of Fine Arts students in Graphic Design.

Methodology

This research hinged on a quasi-experimental design of pre-test, post-test, non-equivalent, non-randomised control group involving 2x2 x3 factorial design. The independent variables (Artificial Intelligence package and conventional teaching), two levels of gender (male and female) and the levels of academic ability (high, medium and low) were examined. High ability level students were students with percentage scores of 70-100 (A) and 60-69 (B), medium ability level students, were students with percentage scores of 50-59 (C) while those who fell among 45-49 (D), 40-44 (E) and 0-39 (F) with 2, 1 and 0 GPA were classified as students in the low ability level.

This can be presented schematically as

Experimental	O ₁	x	O ₂
Control	O ₃	--	O ₄

The design can be represented thus:

O₁ signifies pre-test for experimental group; X characterises treatment for experimental group; O₂ is post-test for experimental group; ----- represents non randomised, non equivalent subjects; O₃ indicates pre-test for control group; -- is the conventional teaching of Graphic Design for control group; and O₄ signifies post-test for control group;

The study population comprised all Fine and Applied Arts (FAA) teachers-in training in six Federal Colleges of Education (FCOE) in South-western States of Nigeria. Hence, multi-stage sampling technique was used as sample. In the first stage, all six FCOE were selected purposively. At the second stage, random sampling procedure was employed to sample FCOE (Technical), Akoka, Lagos State, and FCOE (Special), Oyo, Oyo State. Finally, random sampling technique was employed to assign FCOE (Technical), Akoka as experimental group and FCOE (Special), Oyo as the control group. 200 level at the two COE intact class of 38 FAA sample technique was used for experimental group and 36 FAA students for the control group. 100L FAA students did not participate in the study because they did not have adequate knowledge background of Graphic design. The 300L FAA students did not participate since were busy with their project at this level. The 200L FAA students were considered suitable for the study.

Artificial intelligence package (AIP) is the only instrument for the treatment of the experimental group. The instruments include Graphic Achievement Test (GAT), Graphic Skill

Test (GST) and Graphic “on the Spot” Skill Assessment Instrument (GOSAI). The GAT, GST and GOSAI were researcher’s design instruments. Graphic Achievement Test (GAT) consists of fifty objective questions with options A to D. on the Poster Designs’ Layout/planning; wording/phrases; captions; size; legibility; simplicity; attractiveness, colour; emphasis and target readers. The items were generated around the three levels of cognitive domain, that is, knowledge, comprehension and application. On the other hand, GST and GOSAI were designed to assess FAA students’ practical skills in Graphic Design. The test item which is “Poster Design” the GST and GOSAI covered the first three levels of Dave’s psychomotor domain taxonomy that include: imitation, manipulation and precision. Nine experts validated the instrument. “four Educational Technology experts from university of Ilorin, Kwara State, North-central, Nigeria validated AIP to consider the appropriateness of the package, and 14 items of questionnaire entitle Educational Technology validation of AIP while five FAA lecturers experts from Kwara State COE, Ilorin, North-central, Nigeria validated GAT, GST and GOSAI to consider the face and content validation with 21 items questionnaire entitle FAA lecturers validation of GAT, GST and GOSAI.

The instruments were validated to test reliability index, A three-week pilot study with two-hour classes per week was carried out on all 18 FAA students from FCOE Abeokuta, Ogun State, South-west, Nigeria. The test-retest approach was chosen to ascertain the instruments’ validity. The GAT, GST and GOSAI were administered for the subjects. PPMC was employed to check the first instrument. Other two instruments were exposed to Crombach Alpha statistics. The coefficient produced 0.86, 0.88 and 0.75 correspondingly. Researcher sought permission from the Dean, school of vocational and Technical in the selected two FCOE through the Head of Department FAA before the commencement of the research programme. Five week was used for the research programme. The first week, selection and training FAA lecturers as research assistants on the use of AIP in experimental group. Also, the pre-test administration using Computer Based Test (CBT) where the control group exposed to Pencil Paper Test (PPT).

In the second week, with the main treatment, experimental group exposed to theoretical aspect of Poster Design in Graphic Design while the control group were taught with conventional instructional strategy. In the third week, the experimental group exposed to AIP and watching a video in relation to Graphic Design, while the control group was taught with traditional strategy. In the fourth week, both groups work on Poster Design in Graphic Design. Finally in the fifth

week, exhibition of design work and rating. Also post-test administration using CBT for experiment group and PPT for the control group. Mean score was employed in answering the questions generated, the independent sample t-test statistics was utilised to test the first two hypotheses, while hypotheses three to five were atested with ANCOVA, all at 0.05 significant level.

Results

Research Question 1: What is the effect of artificial intelligence package on the performance of Fine Arts students Graphic Design?

Table 1: Mean Scores of Artificial Intelligence Package on the Performance of Fine Arts Students in Graphic Design

Group	No	Mean	Standard Deviation
Conventional teaching	36	97.47	8.567
Artificial Intelligent Package	38	118.34	11.357

Table 1 displays that Fine Arts students taught using conventional teaching technique had the mean score 97.47 with standard deviation value 8.567, while those exposed to artificial intelligent packaged had the mean score 118.34 with standard deviation 11.357. This result reveals appreciable transformation in the mean scores. Thus, there is a difference in the performance of students exposed to artificial intelligent package.

Research Question 2: What is the effect of gender on the performance of Fine Arts students in Graphic Design?

Table 2: Mean and Standard Deviation of the Performance of Male and Female Fine Arts Students Exposed to Artificial Intelligent Package

Gender	No	Mean	Standard Deviation
Male	43	110.49	14.297
Female	31	105.00	14.452

Table 2 shows that the male Fine Arts students exposed to Artificial Intelligent Package had the mean score 110.49 with standard deviation value 14.297, and females had the mean score 105.00 with standard deviation 14.452. This reveals a variance in the value of mean scores. Hence, there is a difference between male and female students' performance exposed to Artificial Intelligent Package.

Research Question 3: What is the effect of ability levels on the performance of Fine Arts students in Graphic Design?

Table 3: Mean and Standard Deviation of the Ability Levels on the Performance of Fine Arts Students Exposed to Artificial Intelligent Package

Ability Level	No	Mean	Standard Deviation
Low	24	44.71	3.895
Medium	14	55.50	1.990
High	36	70.72	9.272

Table 3 shows that the ability levels of Fine Arts Students' Performance exposed to Artificial Intelligent Package. The result indicates that low ability level had the mean score 44.71

with standard deviation 3.895, students with medium ability level had the mean score 55.50 with standard deviation 1.990, while students in high ability level had the mean score 70.72 with standard deviation 9.272. This reveals appreciable transformation in the mean scores. Consequently, performance of Fine Arts students with high ability level is better than those in the medium and low ability levels.

Research Question 4: What is the interaction effect of treatment and gender on the performance of Fine Arts students in Graphic Design?

Table 4: Mean and Standard Deviation of Interactive Effect of Treatment and Gender on the Performance Students in Graphic Design

Variable	Mean	Standard Deviation
Artificial Intelligent package	58.71	1.452
Gender	58.71	1.449

Table 4 shows that Fine Arts Students exposed to Artificial Intelligent Package had the mean score 58.71 with standard deviation 1.452 while gender had the mean score 58.71 with standard deviation 1.449. This reveals a variance in the mean scores. Thus, there is a difference between male and performance of students exposed to Artificial Intelligent Package.

Research Question 5: What is the interaction effect of treatment and ability levels on the performance of Fine Arts students in Graphic Design?

Table 5: Mean and Standard Deviation of Interactive Effect of Treatment and Ability Levels on Students' Performance in Graphic Design

Variable	Mean	Standard Deviation
Artificial Intelligent Package	58.71	2.091
Ability level	56.33	2.543

Table 5 shows that Fine Arts students exposed to Artificial Intelligent Package had the mean score 58.71 with standard deviation 2.091 while ability level had the mean score 56.33 with standard deviation 2.543. This result reveals an appreciable change in the mean scores. Consequently, there is a difference between the performance of students in graphic design exposed to artificial intelligent package based on the ability level.

Hypotheses Testing

Hypothesis One: There is no significant difference between experimental and control groups mean score performance of Fine Arts students in Graphic Design

Table 6: Summary of t-test on Difference between Experimental and Control Groups Mean Score Performance of Fine Arts Students in Graphic Design Exposed to AIP

Variable (Posttest scores)	No	Mean	Std.D	df	t	Sig(p)	Remark
Conventional Technique	36	97.4722	8.56733	72	8.886	0.000	S
Artificial Intelligent package	38	118.3421	11.35728				

Table 6 illustrates that a significant difference exists between experimental and control group mean scores performance of students in Graphic Design ($df = 72$; $t = 8.886$; $p < 0.05$). Since hypothesis 1 is rejected, therefore, a statistically significant difference exists between experimental and control groups mean score performance of students in Graphic Design.

Hypothesis Two: There is no significant difference between male and female mean score performance of Fine Arts students in Graphic Design.

Table 7: Summary of t-test Showing Difference between Male and Female Mean Score Performance of Students in Graphic Design

Variable (Posttest scores)	No	Mean	Std.D	df	t	Sig(p)	Remark
Male	43	110.4884	14.29681	72	1.622	.109	NS
Female	31	105.0000	14.45222				

Table 7 indicates there is no significant difference in the male and female performance of students in Graphic Design ($df = 72$; $t = 1.622$; $p > 0.05$). Based on this result, hypothesis 2 is not rejected. Hence, a statistically significant difference exists between the male and female students' performance in Graphic Design.

Hypothesis Three: There is no significant difference in the high, medium and low ability levels performance of students in Graphic Design

Table 8: Summary of ANCOVA Showing Difference in the Ability Level of Fine Arts Students Exposed to AIP

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remarks
Corrected Model	10134.640	3	3378.213	72.026	.000	
Intercept	6874.865	1	6874.865	146.571	.000	
Pretest	126.482	1	126.482	2.697	.105	
Ability level	9897.869	2	4948.935	105.515	.000	S
Error	3283.198	70	46.903			
Total	274564.000	74				
Corrected Total	13417.838	73				

R Squared = .755 (Adjusted R Squared = .745)

Table 8 projects the calculated F-value 105.515 with sig. 0.000 computed at critical level of (0.05). Since the calculated sig. 0.000 is lesser than the critical level 0.05, the hypothesis is rejected. Thus, a significant difference exists in the high, medium and low ability level performance of students in Graphic Design. To ascertain where the significant variation lies, Scheffe Post Hoc analysis was carried out and the output is shown in Table 9.

Table 9: Scheffe Post Hoc Analysis on the Students' Performance of Low, Medium and High Ability Level

Ability Level	No	Subset for alpha = 0.05		
		1	2	3
Low	24	44.71		
Medium	14		55.50	
High	36			70.72
Sig.		.000	.000	.000

Table 9 displays that students with high ability level performed well with mean score 70.72 in subset 3 followed by those with medium ability level with the mean score 55.50 in subset 2, while the low ability level had mean score 44.17 on subset 1. Thus, the high ability level performed better than other levels.

Hypothesis Four: There is no significant interactive effect of treatment and gender on the mean score performance of students in Graphic Design

Table 10: Summary of ANCOVA Showing Interactive Effect in the Performance of Treatment and Gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remarks
Corrected Model	8200.621	4	2050.155	27.114	.000	
Intercept	8596.415	1	8596.415	113.691	.000	
Pretest	393.110	1	393.110	5.199	.026	
Treatment	7057.072	1	7057.072	93.333	.000	
Gender	492.103	1	492.103	6.503	.013	
Treat. * Gender	.166	1	.166	.002	.963	NS
Error	5217.217	69	75.612			
Total	274564.000	74				
Corrected Total	13417.838	73				

R Squared = .611 (Adjusted R Squared = .589)

Table 10 shows the calculated F-value .002 with calculated sig. of .963 computed at critical level of 0.05. Since the calculated sig. (.963) is greater than the critical level (0.05), the hypothesis is retained. Thus, there is no significant interactive effect of treatment and gender on the performance of students in Graphic Design.

Hypothesis Five: There is no significant interactive effect of treatment and ability levels on the mean score performance of students in Graphic Design.

Table 11: Summary of ANCOVA Showing Interaction Effects in the Performance of Treatment and Ability level

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Remarks
Corrected Model	10303.427	6	1717.238	36.943	.000	
Intercept	6935.474	1	6935.474	149.202	.000	
Pretest	194.717	1	194.717	4.189	.045	
Treatment	77.155	1	77.155	1.660	.202	
Ability level	1558.151	2	779.076	6.760	.000	
Treat. * ability level	47.503	2	23.752	.511	.602	NS
Error	3114.411	67	46.484			
Total	274564.000	74				
Corrected Total	13417.838	73				

R Squared = .768 (Adjusted R Squared = .747)

From Table 11, it reveals the calculated F-value .511 with calculated sig. .602 computed at critical level of 0.05. Since the calculated sig. (.602) is greater than the critical level (0.05), the hypothesis is retained. Thus, there is no significant interactive effect of treatment and ability level on the mean score performance of students in Graphic Design.

Discussion of Findings

The findings of this research are discussed in relating to the hypotheses formulated. The findings revealed that a significant difference existed in the experimental and control groups score performance of students in Graphic Design. The outcome corresponds with Jackson (2018) who noted that learners gain more experience in an assignment and learn more than they did previously by experimenting. Dwivedi et al (2021) also maintained that artificial intelligence can help designers with their daily job and expedite time-consuming activities. Therefore, adopting artificial intelligence in higher education can equip students to automate some repetitive chores, freeing up time to concentrate on innovative work.

The research also focused on gender and ability level. The finding of this study indicated average scores of male and female students did not differ significantly in Graphic Design. The finding support the finding of Onyebuchi-Igbokwe et al (2024) who investigated that gender as one of the demographic factors, when taken into account separately, has little bearing on academic achievement of Graphic Design students in Tertiary institutions.

The finding has a notable distinction between the mean performance ratings of Fine Arts students at high, medium and low ability levels in Graphic Design. The result is in line with that of MevlütÜnaAlp (2024) whose findings revealed that that the visual perceptions of the participating students were found to be at the high ability levels, also their attitudes towards graphic design were found to be at a high level. Also the outcome is in consonance with that of Clemente-suaraz et al (2024) who found out that while there were no statistically significant differences in agreeableness, there were substantial differences in extraversion and openness to experience, with female students scoring higher than male students. Additionally, we discovered that there were notable gender variations in conscientiousness and neuroticism, with female students scoring higher than male students. In terms of academic achievement, ladies performed better than males.

Conclusion

The outcomes determined that students' performance in Graphic Design differed significantly between the experimental and the control groups. The mean scores of male and female Fine Arts students' performance in Graphic Design did not differ significantly. The mean score performance of Fine Arts students in Graphic Design showed a substantial difference between high, medium and poor ability levels. The mean score performance of Fine Arts

students in Graphic Design did not significantly have impact on treatment and gender. Additionally, the mean score performance of Fine Arts students in Graphic Design showed no discernible interaction between treatment and ability level.

Recommendations

From this study, the following were recommended:

1. Colleges of education lecturers should adopt and employ artificial intelligent package for Graphic Design instructions.
2. Lecturers should train their students on ICT based instructional techniques such as artificial intelligent to promote their self-sufficiency to learning attainment, learning discovery and student-centered instructional methods.
3. The curriculum for the Nigeria Certificate in Education (NCE) minimal standards should be revised to include artificial intelligence.
4. Students should be encouraged to use online resources, such as artificial intelligence, for educational purposes.
5. In order for instructional strategies like artificial intelligence to be accepted by all the many stakeholders in the educational sector, curriculum developers and the government should adopt a student-centered learning approach in teaching and learning processes.

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