

Students' Perceptions of Digital Tools in Teaching and Learning Fine and Applied Arts

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ABSTRACT

This study investigates the perceptions of undergraduate students regarding the use of digital tools in the teaching and learning of Fine and Applied Arts at Adeyemi Federal University of Education, Ondo. Against the backdrop of the post-COVID-19 pandemic, it examines how studio-based art students integrate such tools in their coursework. A descriptive survey design was employed, using an online questionnaire administered via Google Forms to a convenience sample of 107 undergraduate students from 100-level to 400-level. The instrument captured the students' familiarity with digital tools, their frequency and purpose of use, perceived benefits for creativity and understanding, and the various challenges associated with access and instructional support. Descriptive statistics were used to summarise patterns of device ownership, tool usage, and perceptions across academic levels. The findings indicate that most of the respondents use personal digital devices and show readiness for greater digital integration, particularly where such tools support visualisation, experimentation, and flexible access to learning resources. However, limited infrastructure, unstable internet connectivity, and varied lecturer competence constrain effective adoption. The study recommends strategic ICT infrastructure investment, targeted staff development, and curriculum review as crucial interventions in the alignment of Fine and Applied Arts education in Nigeria with contemporary digital practices and the enhancement of students' learning experiences.

Keywords: Art curriculum development, digital tools, fine arts education, student perceptions, Nigeria.

INTRODUCTION

The global shift to digital learning, accelerated by the COVID-19 pandemic, has emphasised the need to understand Fine and Applied Arts students' perceptions of digital tools, particularly as studio-based programmes adapted to digital strategies. The integration of digital tools in Fine and Applied Arts has revolutionised the way students and educators approach creative processes, enabling new forms of expression and learning. As digital tools such as graphic design software, 3D modelling programs, and virtual platforms become integral to the curriculum, the traditional boundaries of artistic education are expanding. This transformation has been highlighted by Manovich (2016), who examined how the intersection of art and technology has enabled hybrid forms of creativity, blending the digital with the physical in innovative ways. By embracing this shift, educators would not only have enhanced technical proficiency but also would have fostered collaboration and critical thinking, making technology a vital component of modern arts education.

However, Ajayi and Luckay (2023) report that Fine and Applied Arts departments in Nigeria face serious challenges regarding technology resources, device access, and pedagogical approaches. There is considerable variation in technology availability across institutions, which unevenly shapes students' learning experiences. Many students struggle to access computers and other digital devices, limiting their capacity to complete assignments, engage with digital art practices, and build portfolios suitable for contemporary creative industries. In addition, teaching in many programmes remains heavily oriented toward traditional studio methods, with insufficient emphasis on digital skills and tools. To prepare students for the current art world, it is imperative to integrate modern technology more systematically and to strengthen both infrastructural support and pedagogical practices in these departments.

This study, therefore, responds to the growing need for digital tools in art practice that Nigerian universities are not yet adequately meeting. It identifies a clear gap between the demand for contemporary digital technologies in Fine and Applied Arts and the limited resources, skills, and pedagogical support available to use them effectively. This gap risks constraining students' and emerging artists' ability to fully leverage digital technologies in their creative and professional work.

A key problem addressed by this study is the limited empirical evidence on how art students in Nigeria perceive digital tools in both studio-based and theory-based courses. Most existing research on digital tools in education focuses on general education or STEM fields and is predominantly situated in Global North contexts, with little attention to Fine and Applied Arts in sub-Saharan Africa. Consequently, there is a scarcity of context-specific, discipline-focused evidence on how Nigerian art students access devices, become familiar with digital tools, and perceive their impact on creativity and learning outcomes.

This study addresses that gap by providing contextual, discipline-specific evidence on device access, tool familiarity, and perceived impact on creativity and learning outcomes among undergraduate Fine and Applied Arts students in Nigeria. By exploring students' perceptions, the findings contribute to scholarly discussions in art education about how digital platforms can enhance instruction, critique, documentation, and portfolio development in Nigerian higher education.

Accordingly, this study examines undergraduate students' perceptions of digital tools in the teaching and learning of Fine and Applied Arts at Adeyemi Federal University of Education, Ondo. Specifically, it addresses the following research questions:

- i. How familiar are students with digital tools relevant to their studies?
- ii. How frequently and easily do students utilise these tools in their educational practices?
- iii. What benefits do students perceive from using digital tools in their art education?
- iv. What infrastructural or pedagogical challenges do students encounter in the adoption of digital tools?
- v. To what extent do students feel prepared for increased integration of digital tools in their coursework?

The main objectives of the study are to:

- i. assess students' familiarity with digital tools relevant to their studies;
- ii. gauge the frequency and ease of their use of these tools in educational practices;
- iii. identify perceived benefits, such as enhanced creativity or efficiency in producing artworks;
- iv. document infrastructural or pedagogical barriers that may hinder effective digital tool integration; and
- v. evaluate students' readiness to embrace greater digital integration in their art education.

These objectives are justified by the increasing role of digital media in education and the creative industries; understanding student perceptions and experiences can inform curriculum development, support services, staff training, and ICT infrastructure investments within the department and similar contexts.

The study focuses on undergraduate students in the Department of Fine and Applied Arts at Adeyemi Federal University of Education, Ondo, who are currently enrolled and have completed at least one art course involving digital tools. It examines digital tools specifically used for teaching and learning in Fine and Applied Arts, rather than all possible technologies. By exploring students' views, the findings aim to contribute to ongoing scholarly discussions in art education about how digital platforms can enhance instruction, critique, documentation, and portfolio development. Ultimately, the results are intended to guide curriculum revision, teacher training needs, and strategic investments in ICT infrastructure, thereby improving student engagement, teaching quality, and

the overall digital learning landscape in Nigerian art education

Brief History of Digital Tools in Education and in Fine and Applied Arts

The use of digital tools in education began in the 1960s with computers for administrative tasks, but it expanded significantly in the 1970s and 1980s with the advent of personal computers and early computer-assisted instruction (Amhag et al., 2019; Jeng & Zaini, 2025; Jingying, 2025). The 1990s saw a shift with the internet and multimedia technology introducing educational software that included video and audio, enhancing the learning experience for students. Tools like Adobe Photoshop and Macromedia Flash became accessible for creating digital art and animations, particularly in Fine and Applied Arts (Poiasok & Bespartochna, 2025; Wachowiak, 2022).

In the early 2000s, technology such as smartboards, digital projectors, and online platforms like Blackboard transformed classrooms, enabling virtual collaboration and enhancing teaching methods (Haleem et al., 2022; Kalyani, 2024). In arts education, tools like AutoCAD and 3D modelling programs expanded design learning, fostering creativity and technical skill ((Ling & Gao, 2025; Okotubu, 2024).

In the 2010s, tools like Google Drive and online courses made arts education more accessible, allowing people from different backgrounds to learn about digital art (Paul et al., 2023; Al-Samarraie & Saeed, 2018). Today, new technologies like AI, augmented reality, and 3D printing are changing how we teach Fine and Applied Arts, encouraging more creativity and exploration (Al-Ansi et al., 2023; Al-Samarraie & Saeed, 2018).

The evolution of digital tools in education reflects advancements that have transformed teaching and learning in Fine and Applied Arts. As technology continues to develop, it is essential for educators to adapt and integrate these tools effectively, fostering creativity in future generations of artists.

As posited by Chen (2023), the COVID-19 pandemic prompted a significant shift towards digital learning across various educational programmes, including those that rely heavily on studio-based activities, such as art, design, and performing arts. This transition brought both challenges and opportunities for students and educators.

One major challenge in art education is keeping hands-on, interactive activities that studio-based programmes need. According to Singh et al. (2021), many students find it hard to adjust to the lack of direct interaction and feedback that physical studios provide. Creative education often relies on in-person discussions and peer reviews, which are hard to recreate online.

However, moving to digital platforms has pushed educators to find new teaching methods. Virtual tools and software have become more important, allowing for fresh ways to collaborate and be creative. This shift has led teachers to integrate technology into their lessons more deeply, which might improve learning even after the pandemic. While the move to online learning has created challenges for studio-based programmes, it has also sparked innovation and a rethink of traditional teaching methods (Mulenga & Shilongo, 2024). The long-term effects of this change will continue to emerge as schools adjust to new educational needs.

METHODOLOGY

Research design

This study adopted a descriptive survey design to investigate students' perceptions of digital tools in the teaching and learning of Fine and Applied Arts. The design was considered appropriate for obtaining self-reported information on access to devices, familiarity with educational tools, and perceived impact on learning experiences across academic levels.

Population and sampling

The target population comprised undergraduate students in the Department of Fine and Applied Arts from 100-

level to 400-level numbering 387 in total. A convenience sampling strategy was employed, leveraging departmental communication channels and class WhatsApp groups to reach participants efficiently. The intended sample size was 40–100 respondents to support robust descriptive analysis; however, at this preliminary stage, valid responses were obtained from 107 students, representing approximately 37.3% of the Department's undergraduate population at the time of the study. These data are used here to illustrate emerging patterns and to refine the research instrument and procedures for subsequent large-scale data collection.

Research instrument

Data were collected using a structured questionnaire developed by the researcher and administered via Google Forms. The instrument comprised five sections, namely, demographics, access and familiarity, learning experience, benefits and challenges, and readiness.

- i. Demographics addressed academic level and specialisation;
- ii. Access and familiarity dealt with device ownership and knowledge of digital tools;
- iii. Learning experience used five Likert-scale items to capture engagement, ease of use, lecturer support, creativity, and understanding;
- iv. Benefits and challenges utilised multiple-response lists to elucidate responses about perceived advantages and obstacles; and
- v. Readiness explored the willingness to see greater integration of digital tools with a 1–5 readiness scale.

Items were phrased concisely to enhance clarity and completion rates.

Data collection procedure and ethics

The questionnaire link was distributed to students through departmental channels and class WhatsApp groups. Data collection took place over three days, allowing participants to respond at their convenience using mobile phones, tablets, or computers. Ethical considerations were strictly observed, ensuring that participation was voluntary, informed consent was obtained electronically before accessing the instrument, anonymity was assured, and responses were used solely for research purposes. No personally identifiable information was collected, and participants were informed of their right to withdraw at any time without penalty.

Reliability and Validity of the Instrument

The questionnaire included five Likert-scale items designed to capture different dimensions of the study, such as engagement, ease of use, lecturers' support, creativity/productivity, and understanding of course content. Internal consistency reliability was assessed using Cronbach's alpha for these five items based on complete cases ($n = 67$). The analysis yielded a Cronbach's alpha coefficient of 0.509, indicating poor internal consistency when the items are treated as a single scale.

The relatively low alpha is likely due to the multidimensional structure of the instrument in question. The items were purposely written to tap into different but related dimensions of students' perceptions and not a unidimensional construct. Engagement, ease of use, lecturer support, creativity and understanding are distinct facets of the overall learning experience with digital tools. They are thus not expected to be strongly correlated with each other. Following this conceptualisation, the five items are interpreted as separate indicators of perceived learning experience rather than as subscales of a composite score.

Content validity was demonstrated by adapting items from the digital learning and art education literature and then having them reviewed by two experts in art education and educational technology to ensure relevance and clarity.

Data preparation

Responses from Google Forms were exported as a comma-separated values (CSV) file for analysis. The dataset was screened for completeness and accuracy, including verification of the CSV structure, removal of duplicate records, and inspection of missing values. Variables with more than 5% missingness were excluded from analysis, while minor gaps in otherwise complete cases were handled through appropriate imputation procedures. Categorical variables were standardised (e.g., device types and tool categories), and Likert-scale items were converted to numeric codes following a consistent ordering. Full responses on all five Likert items were available for 67 of the 107 respondents; these complete cases were used for the reliability analysis. Variable names were harmonised and assigned descriptive labels, and the final de-identified dataset, named `cleaned_art_education_dataset.csv`, was checked to ensure compliance with ethical requirements regarding anonymity and consent.

Data analysis

Data analysis focused on descriptive statistics and graphical summaries to characterise patterns of device usage, familiarity with digital tools, and perceived learning experiences. In addition to descriptive statistics, inferential analyses were conducted to examine relationships between digital tool usage and students' perceptions of engagement and creativity. A frequency variable was constructed from self-reported usage (Rarely = 1, Weekly = 2, Daily = 3). An engagement score was computed as the mean of four Likert items (engagement, ease of use, lecturer support, understanding), and a creativity score was derived from a single item assessing perceived enhancement of creativity and productivity. Pearson and Spearman correlation analyses examined associations between frequency of digital tool use and engagement and creativity scores. One-way ANOVA tests compared mean engagement and creativity scores across usage frequency groups (Rarely, Weekly, Daily) and across academic levels (100–400 level). Statistical significance was set at $p < .05$. All analyses were performed using IBM SPSS version 30. Each of the five Likert-scale items was analysed separately as an indicator of a specific dimension of perceived learning experience. Descriptive statistics and group comparisons were conducted for each item.

RESULT PRESENTATION

To enhance ease of result interpretation, several visualisations were produced, including a pie chart of devices used for academic work and bar charts comparing mean perception scores by level and summarising the prevalence of specific benefits and challenges.

A pie chart illustrating the distribution of devices used for academic work. Each segment of the pie represents the proportion of users for each type of device (see Fig. 1).

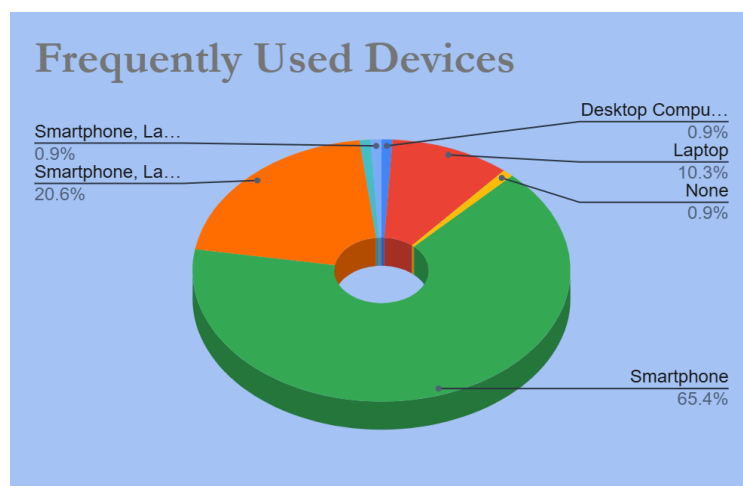


Fig. 1: Frequently used devices by Arts students

A grouped column chart (Fig. 2) displaying the average scores across the measures of engagement, ease of use, creativity, understanding, and lecturer support, presented for the total sample and segmented by academic level.

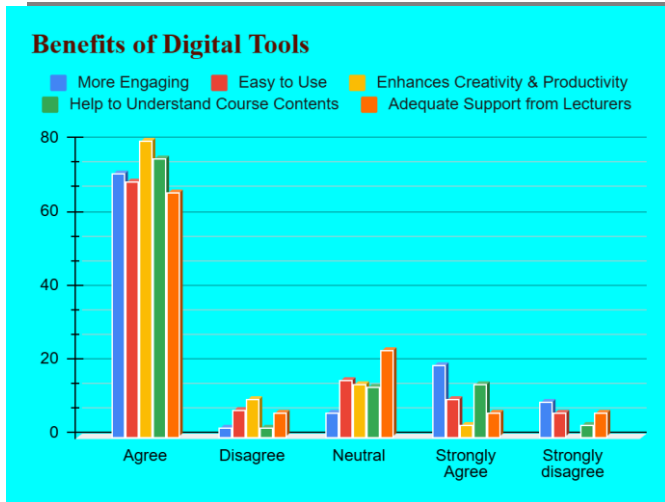


Fig. 2: Benefits of digital tools to Arts students.

A bar chart, shown in Fig. 3, depicted the perceptions of students on their readiness to use digital tools.

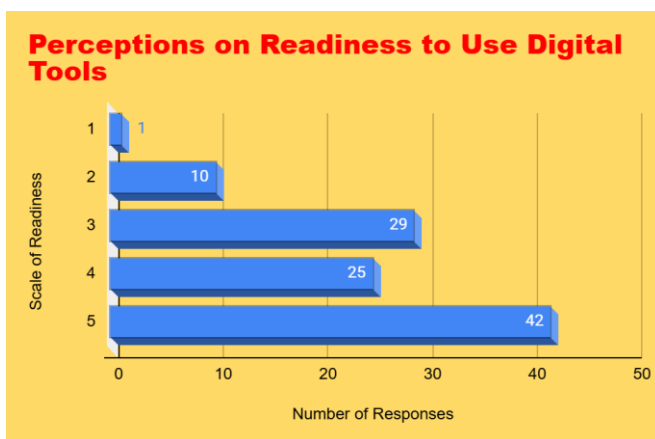


Fig. 3: Perceptions of students' readiness to use digital tools

A bar chart that illustrated the counts of significant challenges reported by participants, such as poor internet connectivity, the high cost of devices, and insufficient training (see Fig. 4).

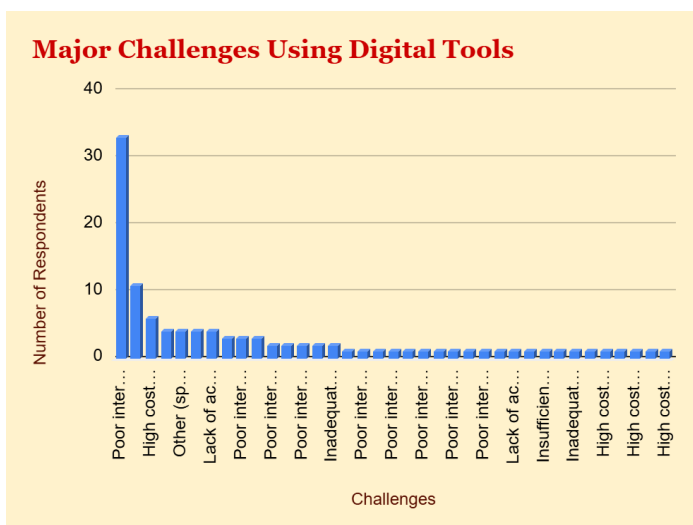


Fig. 4: Challenges faced by Arts students in the use of digital tools

Correlation analyses examined whether more frequent use of digital tools was associated with higher engagement and creativity scores. As shown in Table 1, both Pearson and Spearman correlations revealed very weak to weak positive associations between frequency of digital tool use and engagement (Pearson $r = 0.091$, $p = 0.378$;

Spearman $\rho = 0.150$, $p = 0.144$), and between frequency of use and creativity (Pearson $r = 0.155$, $p = 0.133$; Spearman $\rho = 0.164$, $p = 0.111$). None of these relationships reached statistical significance at the 0.05 level, indicating that, in this sample, more frequent use of digital tools was not strongly associated with higher perceived engagement or creativity.

Table 1. Correlations among frequency of digital tool use, engagement, and creativity

Variable	Correlation Type	r/p	p-value
Frequency of use – Engagement	Pearson	0.091	0.378
Frequency of use – Engagement	Spearman	0.150	0.144
Frequency of use – Creativity	Pearson	0.155	0.133
Frequency of use – Creativity	Spearman	0.164	0.111

One-way ANOVA was used to compare engagement and creativity scores across students who reported using digital tools rarely, weekly, or daily (Table 2). Mean engagement scores were similar across groups (Rarely = 3.60, Weekly = 3.61, Daily = 3.76), and the difference was not statistically significant, $F(2, 93) = 0.49$, $p = 0.614$. Creativity scores were highest among daily users (Rarely = 3.89, Weekly = 3.78, Daily = 4.16), but this difference also did not reach statistical significance, $F(2, 93) = 2.56$, $p = 0.083$.

Table 2. Mean engagement and creativity scores by frequency of digital tool use

Frequency of use	Engagement Mean (SD)	Creativity Mean (SD)
Rarely	3.60	3.89
Weekly	3.61	3.78
Daily	3.76	4.16

Note: Engagement: $F(2, 93) = 0.49$, $p = 0.614$; Creativity: $F(2, 93) = 2.56$, $p = 0.083$.

Engagement and creativity scores were also compared across academic levels (100–400 level). Engagement means ranged from 3.17 (300 level) to 3.82 (100 level), but differences were not statistically significant, $F(2, 93) = 2.14$, $p = 0.100$. Creativity means were similar across levels (100 = 3.94, 200 = 3.92, 300 = 4.00, 400 = 4.05), $F(2, 93) = 0.19$, $p = 0.906$.

Table 3. Mean engagement and creativity scores by academic level

Academic level	Engagement Mean (SD)	Creativity Mean (SD)
100 level	3.82	3.94
200 level	3.62	3.92
300 level	3.17	4.00
400 level	3.80	4.05

Note: Engagement: $F(3, 93) = 2.14$, $p = 0.100$; Creativity: $F(3, 93) = 0.19$, $p = 0.906$.

DISCUSSION OF FINDINGS

The findings of this study reveal that undergraduate students in the Department of Fine and Applied Arts at Adeyemi Federal University of Education are generally familiar with basic digital devices, particularly smartphones, but have more limited access to computers and specialised art software. Most respondents reported using digital tools primarily for coursework documentation, image editing, and research, while fewer reported using them for advanced creative practices such as digital illustration, 3D modelling, or digital portfolio

development. Students perceived multiple benefits of digital tools, including enhanced creativity, easier documentation of artworks, and greater flexibility in accessing learning materials. However, these benefits were moderated by significant infrastructural and pedagogical challenges, including unstable internet connectivity, high cost of devices and software, and limited lecturer competence in digital pedagogies. Students expressed a positive readiness to embrace greater digital integration, provided that institutional support is strengthened.

These patterns align with broader literature on digital learning in art and design education. Chen (2023) for example, argues that the COVID-19 pandemic accelerated the adoption of digital tools across studio-based programmes, creating opportunities for creativity and flexibility while exposing gaps in infrastructure and staff preparedness. Similarly, this study shows that students value digital tools for enhancing creativity and enabling flexible access to resources, consistent with reports that virtual platforms can foster new forms of collaboration, experimentation, and digital portfolio development in art education.

However, some findings contrast with existing literature. In many studies from the Global North, students typically report reliable access to institutional computers, high-speed internet, and a range of professional software, with challenges centred more on pedagogical adaptation than on basic access. In contrast, Nigerian Fine and Applied Arts students in this study identified device access and infrastructure as primary constraints. This aligns with Ajayi and Luckay (2023), who report serious technology resource deficits in Nigerian Fine and Applied Arts departments, including uneven technology availability across institutions and limited emphasis on digital skills in teaching. The present study extends this evidence by focusing specifically on students' perceptions in a Nigerian university context, rather than general education or STEM contexts, which dominate the literature.

The context matters for several reasons. First, Fine and Applied Arts education in Nigeria remains heavily studio-based and traditionally oriented, with many lecturers relying on conventional methods and giving limited attention to digital skills. This contrasts with many international contexts where digital tools are more systematically integrated into art curricula from early stages. Second, infrastructural constraints in Nigeria, such as unreliable electricity, limited broadband coverage, and high import costs for devices and software, shape students' experiences in ways that are less pronounced in Global North settings. These contextual factors help explain why, despite positive perceptions and readiness, students' actual use of advanced digital tools remains constrained.

The finding that students perceive digital tools as enhancing creativity, yet face barriers to advanced use, supports Singh et al.'s (2021) observation that creative education relies heavily on in-person interaction and studio feedback, which are difficult to replicate online. In this study, students appear to view digital tools as complementary to, rather than a replacement for, traditional studio practice, using them to support documentation, research, and preliminary design while still relying on physical studios for core creative work. This hybrid orientation may reflect both the potential of digital tools and the limitations of the current institutional context.

All things considered, the study provides discipline-specific, context-specific evidence about how Nigerian Fine and Applied Arts students use devices, familiarise themselves with digital tools, and assess their influence on learning outcomes and creativity. This addresses a gap in the literature, which is primarily composed of STEM or general education studies from the Global North, and offers a basis for curricular and policy interventions specific to art education in Nigeria.

Contrary to expectations, students' perceived engagement and creativity were not significantly correlated with how frequently they used digital tools. The difference was not statistically significant, despite daily users reporting somewhat higher creativity scores. This implies that the quality of integration, pedagogical support, and alignment with studio tasks may have a greater impact on engagement and creativity than frequency of use alone.

Furthermore, engagement and creativity scores did not differ significantly across academic levels, indicating that students' perceptions of digital tools are relatively stable from early to advanced stages of the programme. This may reflect persistent infrastructural and pedagogical constraints that affect all levels similarly, as well as the

continued dominance of traditional studio methods across the curriculum.

Discussion of Anomalies or Unexpected Findings

A few unexpected patterns emerged, which merit further consideration. While the majority of participants identified inadequate internet connectivity as a significant challenge, a notable subset reported having adequate access but struggling primarily with the costs of devices and software. This is somewhat surprising given the perceived lower cost of consumer technology. This suggests that affordability constraints continue to be a significant barrier in this context, even when connectivity is available. Cross-tabulations found that laptop ownership was associated with higher familiarity with more complex academic tools. However, some students who relied primarily on smartphones reported relatively high engagement scores, challenging the assumption that device type alone determines effective use of digital applications. These anomalies highlight the importance of taking into account not only hardware but also students' digital literacies, support structures, and how tools are integrated into teaching and assessment.

The combination of quantitative analysis and visual representations in this study helped clarify how device usage and familiarity with tools relate to students' engagement, while also highlighting nuanced patterns that simple frequency counts might overlook. These insights can inform more targeted educational policies and support strategies aimed at addressing specific infrastructural and pedagogical barriers.

Limitations of the study and future research

This study is limited by its focus on a single institution and its relatively small initial sample, which restricts the generalisability of the findings beyond the specific departmental context. Future research should replicate this study across multiple Nigerian universities and include larger, more diverse samples to examine variations by region, institution type, and specialisation. Longitudinal studies could also track how students' perceptions and digital competencies evolve over their programme and into their professional practice.

The five Likert-scale perception items showed limited internal consistency (Cronbach's $\alpha = 0.509$) when treated as a single scale, reflecting their multidimensional nature. In future research, separate subscales for engagement, ease of use, lecturer support, creativity, and understanding, each with multiple items, could be developed to improve reliability and allow more robust psychometric evaluation.

CONCLUSION

This study examined undergraduate students' perceptions of digital tools in the teaching and learning of Fine and Applied Arts at Adeyemi Federal University of Education, Ondo. The findings indicate that students are positively disposed to digital tools and perceive them as beneficial for creativity, documentation, and flexible access to learning materials. However, their use of digital tools is constrained by limited access to devices and computers, unstable internet connectivity, high costs of software and hardware, and insufficient lecturer competence in digital pedagogies. Despite these challenges, students express a strong readiness for greater digital integration in their coursework.

The results have clear implications for curriculum design, lecturer training, and institutional infrastructure in Fine and Applied Arts departments. First, the curriculum should explicitly incorporate digital competencies as core learning outcomes, including skills in digital image editing, portfolio development, documentation, and basic design software. Digital tools should not be treated as optional add-ons but as integral components of studio and theory courses, aligned with contemporary creative industry demands.

Second, lecturer training programmes are needed to build capacity in digital pedagogies. Many instructors in Fine and Applied Arts are accustomed to traditional studio methods and may lack confidence or expertise in using digital tools for teaching, critique, and assessment. Targeted professional development, workshops, and communities of practice can help lecturers integrate digital tools effectively into studio instruction, online critique sessions, and portfolio reviews.

Third, institutional infrastructure must be strengthened to support digital learning. This includes providing campus computer labs with reliable high-speed internet, subsidised or loan schemes for devices, access to affordable or open-source art software, and sustained technical support. Without such investments, the potential of digital tools to enhance creativity and learning will remain unrealised for many students.

In conclusion, strategic investment in ICT infrastructure, deliberate curriculum reform, and sustained staff development are essential to align Fine and Applied Arts education in Nigeria with contemporary digital practices. By addressing these areas, Nigerian universities can better prepare art students to utilise digital technologies in their creative work and to compete effectively in the global creative economy.

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