Digital Literacy in Nigeria Tertiary Institution: A Case Study of Kano State Colleges of Education

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Abstract- ***This study investigates the state of digital literacy in Nigeria's tertiary institutions, specifically focusing on Colleges of Education in Kano State. A descriptive survey design was employed to collect data from 150 academic and administrative staff through structured questionnaires and interviews. The research examines disparities in digital infrastructure, staff competency in using modern technology, and the challenges hindering the effective integration of digital tools in teaching and learning. The findings reveal a moderate availability of digital resources and infrastructure; however, issues persist, particularly concerning internet reliability and the unequal distribution of resources. Staff members displayed moderate digital proficiency, but barriers to full adoption include lack of motivation, generational skill gaps, and high workloads. Key challenges identified include limited funding, inadequate policy frameworks, and resistance to change. Statistical analyses indicate significant positive correlations between digital infrastructure, staff competency, and the challenges of integration. The study concludes that enhancing digital literacy in Nigerian Colleges of Education requires comprehensive interventions, including improved infrastructure, policy enforcement, ongoing staff training, and motivational strategies. These findings offer critical insights for policymakers and stakeholders aimed at bridging the digital divide and promoting inclusive, technology-driven education in Nigeria.***

I. INTRODUCTION

Nigeria, a nation of cultural richness and growing technological advancement is navigating the demands of modernity by integrating digital tools across critical sectors, especially education. Colleges of Education, charged with preparing future teachers, must adopt digital literacy to ensure graduates are equipped for contemporary educational challenges [3], [6].

Globally, education has evolved significantly due to rapid technological innovation. Digital tools have enhanced teaching methodologies, making learning more interactive, personalised, and accessible [1], [2]. Nigerian Colleges of Education must align with these developments to remain globally relevant [4], [5].

Digital literacy is essential not just for academic transformation, but also for realising Nigeria’s broader vision of a knowledge-based, digitally competent economy [6], [7]. However, the education sector faces major challenges: inadequate infrastructure, unequal access, and regional disparities [8].

Studies from both developed and developing contexts reveal the transformative potential of digital tools. Yet, challenges such as low staff competence, resistance to change, and limited funding persist [9], [10]. Particularly in Nigeria, there's a notable institutional digital divide and inconsistent capacity training in digital tools [14], [15].

Research shows that staff competence in using digital technology directly affects student learning outcomes [11], [12], [13]. However, the digital divide extends beyond access, it includes variations in digital skills and usage [15]. National policies and institutional frameworks are therefore critical in supporting widespread, equitable digital literacy adoption [16], [17].

By understanding the current state of digital literacy within Colleges of Education, this study aims to uncover opportunities for leveraging technology to enhance educational access, quality, and inclusivity.

II. STATEMENT OF THE PROBLEMS

The integration of digital technology in education is increasingly recognized as essential for preparing students for success in the digital age. However, within the Nigerian context, there remains a significant gap in understanding the current state of digital literacy within Colleges of Education. This research seeks to address this gap by examining the following key issues:

1. Institutional Digital Divide: There is a lack of comprehensive understanding regarding the disparities in digital infrastructure and resources among Nigerian Colleges of Education. This digital divide may exacerbate inequalities in educational opportunities and hinder the effective utilization of technology for teaching and learning.
2. College Digital Competency: The level of digital competency among college members within Nigerian Colleges of Education is not well-documented. Without adequate training and support, educators may struggle to effectively integrate digital tools into their teaching practices, limiting the potential benefits of technology for student learning outcomes.

Challenges and Opportunities: Despite the potential benefits, there are numerous challenges associated with integrating digital technology into teaching and learning within Nigerian Colleges of Education. These challenges may include inadequate funding, infrastructure limitations, and resistance to change. Conversely, there may be untapped opportunities for leveraging technology to enhance educational quality, access, and inclusivity.

Objectives of the Study

1. To identify and analyze the disparities in digital infrastructure and resources among Colleges of Education in Nigeria.
2. To assess the competency of academic and non-academic staff in the effective use of modern technology for teaching and learning purposes.
3. To investigate the challenges that impede the smooth integration of digital tools into the educational system.

Research Questions

1. What are the existing disparities in digital infrastructure and resources among Colleges of Education in Nigeria?
2. How competent are academic and non-academic staff in the use of modern technology for teaching and learning in Colleges of Education?
3. What are the key challenges hindering the effective integration of digital tools into the educational system of Nigerian Colleges of Education?

Hypotheses

- Null Hypothesis (H_{01}): There is no significant relationship between the level of digital infrastructure and resources and the competency of staff in using modern technology for teaching and learning.
- Null Hypothesis (H_{02}): There is no significant relationship between the availability of digital infrastructure and resources and the challenges in integrating digital tools into the educational process.
- Null Hypothesis (H_{03}): There is no significant relationship between staff competency in using modern technology and the challenges of integrating digital tools into teaching and learning.

Significance of the studies

This study on "Digital Literacy in Nigeria's Tertiary Institutions: A Case Study of Kano State Colleges of Education" is significant for several reasons:

1. Policy Development and Implementation:
2. By identifying disparities in digital infrastructure and resources, the study will provide empirical evidence that can guide policymakers and education stakeholders in making informed decisions on equitable distribution and improvement of digital facilities across Colleges of Education. This will help bridge the digital divide in Nigeria's tertiary education sector.
3. Capacity Building for Educators and Administrators:
4. The assessment of staff competency in utilizing modern technology will highlight existing skill

gaps and training needs. This information is vital for designing targeted professional development programs that enhance the digital literacy of academic and non-academic personnel, ultimately improving teaching and administrative efficiency.

5. Improving Digital Integration Strategies:
6. Investigating the challenges hindering the integration of digital tools will uncover structural, technical, and human factors that affect technology adoption in education. The insights gained will support the development of effective digital integration strategies tailored to the local context of Colleges of Education in Kano State and beyond.
7. Contribution to Educational Research and Innovation:
8. The findings will contribute to the growing body of knowledge on digital literacy in Nigeria's tertiary institutions. Researchers, curriculum developers, and educational technologists can draw upon this study to design innovative approaches to digital education that are relevant, inclusive, and sustainable.
9. Enhancing Student Learning Outcomes:
10. Ultimately, improved digital literacy and infrastructure within Colleges of Education will benefit students by promoting interactive and technology-driven learning environments. This can enhance learning interest, career readiness, and academic performance, particularly in a rapidly digitalizing world.

In sum, this study aims to inform practice, influence policy, and inspire further research that supports the digital transformation of Nigeria's educational landscape, beginning with a focused exploration of the Colleges of Education in Kano State.

III. METHODOLOGY

This study adopted a descriptive survey research design, which is appropriate for gathering data on current conditions, practices, and opinions relating to digital literacy across Colleges of Education in Kano State. The design enabled the researcher to systematically collect and analyse data on disparities in infrastructure, staff competency, and challenges affecting digital integration. The target population consisted of all academic and non-academic staff, as well as key administrative ICT personnel, across Kano State Colleges of Education and preliminary studies, campuses during the 2024/2024 academic session.

A multi-stage sampling technique was employed:

- Stage 1: Cluster sampling was used to divide the institutions by schools and Departments.
- Stage 2: Stratified sampling was applied to ensure adequate representation of academic, non-academic, and ICT support staff.
- Stage 3: Simple random sampling was then used to select a total of 150 respondents (20 from five schools and 50 administrative staff across), ensuring gender and role balance.

A structured questionnaire titled "Digital Literacy and Integration Assessment Questionnaire (DLIAQ)" was developed by the researcher. The instrument included four sections:

1. Demographic Information
2. Digital Infrastructure and Resources Scale – adapted from existing ICT audit tools.
3. Staff Competency in Digital Technology Use Scale – adapted from the Digital Competence Framework (DigCompEdu).
4. Challenges to Digital Integration Inventory – drawn from the World Bank's EdTech readiness framework.

All items used a 5-point Likert scale ranging from *Strongly Disagree (1)* to *Strongly Agree (5)*. Validity was ensured through expert review, while a pilot study yielded a Cronbach's alpha reliability coefficient of 0.84, indicating good internal consistency. Data were collected in person using printed questionnaires and complemented by interviews with ICT coordinators in each institution. Permissions were obtained from the college authorities, and all ethical protocols were observed, including informed consent and confidentiality assurances.

Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to analyze responses related to the availability of digital infrastructure, staff competence, and integration challenges. And Pearson Product-Moment Correlation was used to test the relationships between:

- Digital infrastructure and staff competence

- Digital infrastructure and integration challenges
- Staff competence and integration challenges

All hypotheses were tested at a 0.5 level of significance using SPSS (version 26).

Table1 : Gender

Gender	Frequencies	Percentage %
Male	110	73.3
Female	40	26.7
Total	150	100

Source: Field Data (2025)

In this study, the questionnaire schedule was administered to respondents. The respondents were given objective questions where they had to indicate their gender. Table 1 indicates that there were 110 male Staff of (73.3%) as opposed to 40 female staff of (26.7%) as respondents.

Table 2: Age of respondents

Age	Frequencies	Percentage %
18-25	08	5.3
26-35	32	21.3
36-45	70	46.7
46 and above	40	26.7
Total	150	100

Source: Field Data (2025)

Table 2 above describes the Age distribution of respondents which shows that 04(2,6%) of the respondents were 18-25 years,16(10.7%) of the respondents were 26-35 years old, 40(26.7%) of respondents were 35-45, while 90(32%) of the respondents were 46 and above years. The result shows that the staff of the college were mature enough to handle academic activities.

Table3 : Cadre

Staff	Frequencies	Percentage %
Academic	100	66.7
Administrative	50	33.3
Total	150	100

Source: Field Data (2025)

Table 3 of this research revealed the frequencies and percentages of the status/cadre of one hundred and fifty (150) respondents. The classification of items from Table 3 shows that 100(66.7%) were academic staff and 50(33.3%) were administrative staff out of the total aggregate respondents.

Table 4: Years of working experience

Experience (years)	Frequencies	Percentage %
1-5	70	46.7
6-10	39	26
11-15	23	13.3
16 and above	18	12
Total	150	100

Source: Field Data (2025)

Table 2 above describes the years of working experience distribution of respondents which shows that 70(46.7%) of the respondents were 1-5 years of working experience,39(267%) of the respondents were 6-10 years of working experience, 23(13.3%) of the respondents were 11-15, while 18(12%) of the respondents were 16 and above years of working experience.

Table 5: Digital literacy level

Level (self-assessment)	Frequencies	Percentage %
Very High	10	7.0
High	42	28
Moderate	82	54.6
Low	16	10.4
Very low	0	0
Total	150	100

Source: Field Data (2025)

From Table 5, 10 (7.0%), 42(28%), 82(54.6%) 16(10.4%), and 0(0.0%) from the staff indicated very high, highly, moderate, low, and very low for the digital literacy level respectively. It shows that both academic and administrative have average and above digital literacy levels.

Research Question 1: What are the existing disparities in digital infrastructure and resources among Colleges of Education in Nigeria?

Table 6: Disparities in digital infrastructure and resources

SN	Item	SA	A	UD	DA	SD	($\bar{X}$)	Std.
	The college provides digital infrastructure(computers, projector, and internet) for academic activities.	109 (72.7%)	41 (27.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3.73	0.447
2	There are sufficient computer laboratories accessible to both students and staff.	94 (62.7%)	48 (32.0%)	0 (0.0%)	1 (0.7%)	7 (4.7%)	3.53	0.739
3	Digital resources, such as e-books and online journals are easily accessible in the college.	58 (38.7%)	84 (56.0%)	0 (0.0%)	1 (0.7%)	7 (4.7%)	3.29	0.708
4	Departments have equal access to digital infrastructure and resources.	62 (44.7%)	72 (48.0%)	0 (0.0%)	3 (2.0%)	8 (5.3%)	3.32	0.763
5	The internet connectivity in the college is reliable and supports academic activities effectively.	35 (23.3%)	82 (54.7%)	0 (0.0%)	15 (10.0%)	18 (12.0%)	2.89	0.899
6	The college prioritizes funding for digital resource acquisition and maintenance.	98 (65.3%)	44 (29.3%)	0 (0.0%)	3 (2.0%)	5 (3.3%)	3.57	0.699
7	Technical support is available to address issues with digital tools and infrastructure.	80 (53.3%)	59 (39.3%)	5 (3.3%)	6 (4.0%)	0 (0.0%)	3.42	.744
	Weighted Average	—	—	—	—	—	3.39	—

Values in parentheses are percentages, N = 150

Table 6 summarises responses from 150 participants regarding the availability, accessibility, and management of digital infrastructure in a college. Each item was rated using a Likert scale ranging from Strongly Agree (SA) to Strongly Disagree (SD). As an interpretation of the results:

Provision of Digital Infrastructure shows an agreement of 100% (SA: 72.7%, A: 27.3%), with a mean ($\bar{X}$) of 3.73 and a standard deviation of 0.447, indicating unanimous satisfaction that the college provides essential digital infrastructure (e.g., computers, projectors, internet). The very low standard deviation suggests a strong consensus among respondents.

Sufficiency of Computer Laboratories shows 94.7% agreement (SA: 62.7%, A: 32.0%) and 5.4% disagreement, with a mean of 3.53 and a standard deviation of 0.739. This indicates that most respondents find the computer labs sufficient, though a small minority express concerns about possible limitations in access or availability at certain times or locations.

Accessibility of Digital Resources (e-books and journals) has 94.7% agreement and 5.4% disagreement, with a mean of 3.29 and a standard deviation of 0.708. While the majority believe digital academic content is accessible, the slightly lower mean and minor disagreement suggest that some users may face difficulties with access or usability.

Equal Access Across Departments shows 92.7% agreement and 7.3% disagreement, with a mean of 3.32 and a standard deviation of 0.763. This suggests that although most believe departments have equal access to digital infrastructure, some perceive disparities, possibly due to factors such as department size, location, or resource allocation priorities.

Internet Reliability receives 78.0% agreement and 22.0% disagreement, with the lowest mean of 2.89 and the highest standard deviation of 0.899. This highlights internet reliability as a significant issue, with the wide range of responses pointing to inconsistent connectivity experiences across different areas of the college.

Funding for Digital Resources shows 94.6% agreement and 5.3% disagreement, with a mean of 3.57 and a standard deviation of 0.699. Respondents largely believe the college is committed to funding digital resources, though some feel the results of such investments are not always clearly visible or equally distributed.

Availability of Technical Support receives 92.6% agreement, 3.3% undecided, and 4.0% disagreement, with a mean of 3.42 and a standard deviation of 0.744. A strong majority agree that technical support is available, but the presence of undecided and disagreeing responses may indicate delays or limitations in the efficiency or reach of these services. The overall weighted mean is 3.39, reflecting a moderately high level of satisfaction with digital infrastructure and services. While the foundational systems appear to be in place, there are notable areas for improvement, particularly concerning internet reliability and the equitable distribution of digital resources across departments.

Research Question 2: How competent are academic and non-academic staff in the use of modern technology for teaching and learning in Colleges of Education?

Table 7: Staff's proficiency in utilizing modern technology for teaching and learning.

SN	Item	SA	A	UD	DA	SD	$(\bar{X})$	Std.
8	Staff in the college are skilled in using digital tools for teaching and learning.	84 (56.0%)	53 (35.3%)	2 (1.3%)	0 (0.0%)	11 (7.3%)	3.40	.843
9	Staff receive regular training to improve their digital skills	105 (70.7%)	39 (26.0%)	0 (0.0%)	1 (0.7%)	5 (3.3%)	3.64	.658
10	Digital platforms like Zoom and Google Classroom are used by staff for teaching	0 (0.0%)	84 (56.0%)	1 (0.7%)	58 (38.7%)	7 (4.7%)	3.29	.708
11	Staff are motivated to incorporate technology into their teaching processes	33 (22.0%)	66 (44.0%)	28 (19.%)	15 (10%)	8 (5%)	2.73	.976
12	Limited knowledge of digital tools among staff affects teaching effectiveness.	35 (23.3%)	82 (54.7%)	0 (0.0%)	15 (10.0%)	18 (12.0%)	2.89	0.899
13	There is a digital divide between older and younger staff in technology usage.	98 (65.3%)	44 (29.3%)	0 (0.0%)	3 (2.0%)	5 (3.3%)	3.57	0.699
14	Staff's workload affects their ability to learn and apply digital teaching methods.	37 (24.7%)	83 (55.3%)	20 (13.3%)	10 (6.7%)	0 (0.0%)	2.98	.807
	Weighted Average	—	—	—	—	—	3.21	—

Values in parentheses are percentages, N = 150

Table 7 describes that Staff Skill in Using Digital Tools shows 91.3% agreement (SA: 56.0%, A: 35.3%) and 7.3% disagreement, with a mean of 3.40 and a standard deviation of 0.843. This suggests that most staff are skilled in using digital tools, though the slightly higher standard deviation indicates some variability in proficiency levels across staff.

Training to Improve Digital Skills receives 96.7% agreement (SA: 70.7%, A: 26.0%) and only 4.0% disagreement, with a mean of 3.64 and a relatively low standard deviation of 0.658. This reflects a strong consensus that staff are receiving regular digital training, contributing positively to overall skill development.

Use of Digital Platforms (Zoom, Google Classroom) shows 56.0% agreement, 0.7% undecided, and 43.4% disagreement (DA: 38.7%, SD: 4.7%), with a mean of 3.29 and standard deviation of 0.708. The high disagreement suggests a limited adoption of specific digital teaching platforms, which may reflect varying preferences, training levels, or technical constraints.

Staff Motivation to Use Technology shows the lowest agreement at 66.0% (SA: 22.0%, A: 44.0%), with 15.0% disagreement and 19.0% undecided, a mean of 2.73, and the highest standard deviation at 0.976. This indicates low motivation and significant variation among staff in embracing technology—an area needing targeted intervention.

Impact of Limited Digital Knowledge on Effectiveness receives 78.0% agreement (SA: 23.3%, A: 54.7%) and 22.0% disagreement, with a mean of 2.89 and a standard deviation of 0.899. The relatively low mean suggests that while many agree digital knowledge gaps affect teaching, not all staff see it as a critical issue.

The Digital Divide Between Older and Younger Staff has 94.6% agreement (SA: 65.3%, A: 29.3%) and 5.3% disagreement, with a high mean of 3.57 and a standard deviation of 0.699. This strongly supports the perception that age-based digital skill disparities exist among staff, indicating a need for differentiated training approaches.

Impact of Workload on Tech Adoption shows 80.0% agreement (SA: 24.7%, A: 55.3%), 13.3% undecided, and 6.7% disagreement, with a mean of 2.98 and a standard deviation of 0.807. This implies that staff workload is a significant barrier to learning and implementing digital teaching strategies.

Overall Weighted Mean: 3.21, reflects a moderate level of staff proficiency in using modern technology for teaching and learning. While training efforts are evident and most staff are digitally competent, key challenges persist, including lack of motivation, uneven use of digital platforms, and generational skill gaps. The variation in responses suggests opportunities for improved support, targeted professional development, and strategic workload management to enhance digital integration.

Research Questions 3: What are the key challenges hindering the effective integration of digital tools into the educational system of Nigerian Colleges of Education?

Table 8: The obstacles hindering the seamless incorporation of digital tools into Nigerian Colleges of education.

SN	Item	SA	A	UD	DA	SD	($\bar{X}$)	Std.
15	Limited funding is a major obstacle to acquiring adequate digital resources.	84 (56.0%)	53 (35.3%)	2 (1.3%)	0 (0.0%)	11 (7.3%)	3.40	.843
16	Poor internet connectivity affects the effective use of digital tools	105 (70.7%)	39 (26.0%)	0 (0.0%)	1 (0.7%)	5 (3.3%)	3.64	.658

17	Lack of access to electricity supply hinders the adoption of digital tools.	58 (38.7%)	84 (56.0%)	1 (0.7%)	0 (0.0%)	7 (4.7%)	3.29	.708
18	Resistance to adopting digital tools due to traditional teaching methods is common.	33 (22.0%)	66 (44.0%)	28 (19.%)	15 (10%)	8 (5%)	2.73	.976
19	The institution lacks policies that mandate the integration of digital tools into teaching	35 (23.3%)	82 (54.7%)	0 (0.0%)	15 (10.0%)	18 (12.0%)	2.89	0.899
20	There are insufficient skilled technical staff to manage digital infrastructure and tools.	98 (65.3%)	44 (29.3%)	0 (0.0%)	3 (2.0%)	5 (3.3%)	3.57	0.699
21	Students face challenges in owning or accessing personal digital devices for academic purposes	37 (24.7%)	83 (55.3%)	20 (13.3%)	10 (6.7%)	0 (0.0%)	2.98	.807
	Weighted Average	—	—	—	—	—	3.21	—

Values in parentheses are percentages, N = 150

Table 8 shows that Limited Funding shows 91.3% agreement (SA: 56.0%, A: 35.3%) and 7.3% disagreement, with a mean ($\bar{X}$) of 3.40 and a standard deviation of 0.843. This indicates that most respondents view inadequate funding as a significant barrier to digital integration, though the moderate standard deviation suggests that this issue may vary by institution.

Poor Internet Connectivity receives the highest agreement at 96.7% (SA: 70.7%, A: 26.0%), with only 4.0% disagreement. The mean is 3.64 and the standard deviation is 0.658. This makes it the most strongly acknowledged obstacle, with relatively low variation in responses, emphasizing internet reliability as a critical issue for digital teaching and learning.

Inconsistent Electricity Supply shows 94.7% agreement and 4.7% disagreement, with a mean of 3.29 and a standard deviation of 0.708. While not as prominent as internet or funding issues, electricity supply remains a well-recognized barrier to consistent digital engagement, especially in less urbanized areas. Resistance to Change Due to Traditional Teaching Methods has 66.0% agreement, with 19.0% undecided and 15.0% (DA + SD) disagreement. It holds the lowest mean of 2.73 and the highest standard deviation of 0.976. This reflects significant variation in staff attitudes toward technology, indicating that cultural and pedagogical resistance is a notable psychological barrier in some institutions.

The absence of Institutional Digital Policies sees 78.0% agreement and 22.0% disagreement, with a mean of 2.89 and a standard deviation of 0.899. The data suggest that a lack of formal policies in many institutions contributes to unclear or inconsistent digital integration practices.

Shortage of Skilled Technical Staff shows a high agreement of 94.6%, with 5.3% disagreement. The mean is 3.57 and the standard deviation is 0.699. This indicates that most institutions struggle with maintaining or supporting digital infrastructure due to the lack of trained technical personnel.

Students' Difficulty Accessing Personal Digital Devices shows 80.0% agreement and 20.0% neutral or disagreement, with a mean of 2.98 and a standard deviation of 0.807. This reflects an economic challenge affecting student access to learning technologies, highlighting socio-economic disparities in digital inclusion.

The overall weighted average mean is 3.21, reflecting moderate to high agreement on the existence of several major obstacles. These challenges are multifaceted—ranging from infrastructural and economic constraints to policy gaps and human resource limitations—requiring systemic strategies to address them effectively.

Test of Research Hypothesis

H_{01}: There is no significant relationship between the level of digital infrastructure and resources and the competency of staff in using modern technology for teaching and learning.

Table 9: Correlation statistical analysis between Digital infrastructure and resources and competency of staff in using modern technology

Variables	N	$\bar{X}$	S.D	D.F	Calculated R-values	Critical r-value	Decision
Digital infrastructure and resources	150	62.91	12.7		.220	.159	H_{O1}: Rejected
competency of staff in using modern technology	150	61.75	12.9	148			

Table 9 above shows that the calculated r-value (.220) of Pearson Product Movement Correlation Statistics is greater than the critical r-value (.159) for 148 degrees of freedom at a 5% alpha level of significance. As a result, the null hypothesis, which states that there is no significant relationship between the level of digital infrastructure and resources and the competency of staff in using modern technology for teaching and learning, is hereby rejected. As a result, there is a low positive relationship between the digital infrastructure and resources and the competency of staff in using modern technology. The two variables are related in the sense that one is more likely to influence the other.

H_{02}: There is no significant relationship between the availability of digital infrastructure and resources and the challenges in integrating digital tools into the educational process.

Table 10: Correlation statistical analysis between Digital infrastructure and resources and the challenges in integrating digital tools into the educational process

Variables	N	$\bar{X}$	S.D	D.F	Calculated r-value	Critical r-value	Decision
Digital infrastructure and resources	150	71.33	17.3		.275	.159	H_{O2}: Rejected
Challenges in integrating digital tools into the educational process	150	61.75	12.9	148			

Table 10 above revealed that the calculated r-value (.275) of Pearson Product Moment Correlation Statistics is greater than the critical r-value (.159) for 148 degrees of freedom at a 0.5 alpha level of significance. Hence, the null hypothesis which states that There is no significant relationship between the availability of digital infrastructure and resources and the challenges in integrating digital tools into the educational process is rejected. This implies that there is a positive significant relationship between relationship Digital infrastructure and resources and the existing Challenges in integrating digital tools into the educational process.

H_{03}: There is no significant relationship between staff competency in using modern technology and the

challenges of integrating digital tools into teaching and learning.

Table 11: Correlation statistical analysis between staff competency in using modern technology and the challenges in integrating digital tools into the educational process

Variables	N	$\bar{X}$	S.D	D.F	Calculated r-value	Critical r-value	Decision
staff competency in using modern technology	150	71.33	13.03		.274	.159	H_{O3}: Rejected
Challenges in integrating digital tools into the educational process	150	61.75	12.9	148			

Table 11 above revealed that the calculated r-value (.274) of Pearson Product Moment Correlation Statistics is greater than the critical r-value (.159) for 148 degrees of freedom at a 0.5 alpha level of significance. Hence, the null hypothesis which states that there is no significant relationship between staff competency in using modern technology and Challenges in integrating digital tools into the educational process is rejected. This implies that there is a positive significant relationship between staff competency in using modern technology and Challenges in integrating digital tools into the educational process.

IV. DISCUSSION OF THE RESULTS

The findings of this study offer valuable insight into the current state of digital literacy within Colleges of Education in Kano State, Nigeria. While there is evidence of progress in terms of infrastructure and awareness, several systemic and operational challenges continue to hinder the seamless integration of digital tools in teaching and learning. The data in Table 6 reflects a generally positive outlook regarding the availability of digital infrastructure, particularly computers, projectors, and technical support. However, a relatively low mean score for internet reliability ($\bar{X}$ = 2.89) suggests that connectivity remains a bottleneck to consistent digital engagement. Furthermore, disparities in resource distribution across departments point to an institutional digital divide, where infrastructure is available in theory but inequitably accessible in practice. These findings are consistent with global reports highlighting infrastructural inconsistencies in developing educational systems [2], [4].

Table 7 reveals a moderate level of digital proficiency among staff (weighted mean = 3.21), yet motivation and uniformity in usage remain problematic. For example, the low motivation score ($\bar{X}$ = 2.73) and generational gaps in digital skills reflect internal disparities. These findings mirror those of Adeoye and Olatoye [3], who emphasize that digital competency is often influenced by age, training exposure, and institutional support. A lack of targeted professional development can exacerbate these gaps, undermining efforts to embed digital tools into pedagogy effectively.

Findings from Table 8 underscore the prominence of infrastructural and policy-related challenges in digital integration. Poor internet connectivity ($\bar{X}$ = 3.64), limited funding ($\bar{X}$ = 3.40), and the shortage of technical personnel ($\bar{X}$ = 3.57) are among the top barriers identified. Additionally, resistance to change ($\bar{X}$ = 2.73) and the absence of formal integration policies ($\bar{X}$ = 2.89) reflect deeper organizational inertia. Ertmer [9] categorizes these as "first- and second-order barriers," where both external (resources) and internal (attitudes) factors affect the adoption of educational technology. The rejection of all three null hypotheses suggests statistically significant relationships among the studied variables: A positive correlation between digital infrastructure and staff competency (r = 0.220), a moderate relationship between infrastructure and integration challenges (r = 0.275), and a similar connection between staff competency and integration challenges

(r = 0.274). These results reinforce the argument that enhanced infrastructure and increased staff capability are fundamental to reducing digital integration barriers. As Selwyn [5] asserts, digital transformation in education is not merely a technical shift but also a cultural and institutional one.

CONCLUSION

The study concludes that while substantial progress has been made in providing digital infrastructure within Colleges of Education in Kano State, challenges such as unequal access, internet unreliability, and insufficient policy enforcement remain. Staff possess moderate levels of digital competency, but issues of motivation, generational skill gaps, and workload affect their ability to fully utilize digital tools. The significant relationships found between infrastructure, staff competency, and integration challenges highlight the interdependence of these variables in shaping digital literacy outcomes.

RECOMMENDATIONS

Based on the findings, the following actionable recommendations are made:

1. Strengthen Digital Infrastructure:
   - Expand internet coverage and improve bandwidth reliability across all departments.
   - Ensure equitable distribution of digital resources to bridge inter-departmental gaps.
2. Implement Comprehensive Digital Literacy Policies:
   - Develop and enforce institutional policies that mandate and support digital tool integration.
   - Establish clear guidelines for digital resource usage and staff accountability.
3. Invest in Continuous Staff Training:
   - Introduce regular and inclusive professional development workshops focused on emerging technologies.
   - Offer differentiated training that addresses the digital divide between older and younger staff.
4. Motivate and Incentivize Technology Adoption:
   - Create reward systems or recognition programs for staff who effectively integrate digital tools.
   - Reduce excessive workloads that may prevent staff from learning and applying new technologies.
   - Provide 24/7 support hotlines or help desks for staff encountering technical difficulties.

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