

Human and Technological Resource Management and Students' Academic Achievement in Public Secondary Schools in North Central Nigeria

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Abstract: This study examined the relationships between human resource management, technological resource management and students' academic achievement in public secondary schools in North Central Nigeria. A cross-sectional descriptive survey design was adopted. The study population comprised 23,134 principals and teachers in 487 public secondary schools, from which 2,313 respondents in 49 schools were sampled; 2,195 usable questionnaires were retrieved, representing a 94.9% response rate. Data were collected with the Questionnaire on Relationship between School Resource Management and Students' Academic Achievement (QRSRMSAA), complemented by a pro-forma for harvesting students' examination scores. The 24-item questionnaire used a four-point response scale, had a reported logical validity index of 0.80 and a split-half reliability coefficient of 0.82. Mean and standard deviation addressed the research questions, while Pearson's product-moment correlation tested the hypotheses at the 0.05 level. Human resource management recorded a cluster mean of 3.34, while technological resource management recorded 3.37. Both human resource management and technological resource management showed positive, statistically significant relationships with students' academic achievement ($r = 0.364$, $p < .05$ for each). The study concludes that effective management of personnel and technology is associated with stronger academic outcomes, while cautioning that the cross-sectional design does not establish causation. It recommends sustained teacher development, supportive school leadership, appropriate regulation and pedagogical use of digital technologies, and improved maintenance of ICT resources.

Keywords: human resource management, technological resource management, academic achievement, ICT, public secondary schools

1. Introduction

Educational outcomes depend not only on the availability of school resources but also on how those resources are organised, deployed, supervised and sustained. Teachers and school leaders constitute the central human resources of the school system, while computers, connectivity, digital platforms, projectors and other information and communication technology (ICT) facilities increasingly shape teaching, learning and administration. Teacher quality is consistently associated with differences in student learning [1], and effective educational administration requires deliberate attention to the development and coordination of personnel [2].

Technology can expand access to information, enrich classroom interaction and support independent learning, but its educational value is not automatic. Meta-analytic evidence indicates a generally positive but context-dependent effect of technology on learning [3]. UNESCO similarly stresses that technology works best when it is aligned with educational purpose, teacher capacity, equitable access, infrastructure and sustainability [4]. In Nigeria, earlier studies have identified electricity, connectivity, inadequate facilities, teacher competence and institutional support as persistent barriers to meaningful ICT integration [5], [6].

The thesis from which this article is derived documented a population of 23,134 principals and teachers across 487 public secondary schools in Benue, Kogi, Kwara, Nasarawa, Niger and Plateau States and the Federal Capital Territory. It also operationalised students' academic achievement using Senior Secondary Certificate Examination results and included a pro-forma for harvesting students' scores. The present article focuses specifically on two dimensions of the larger study—human resource management and technological resource management—and their relationships with students' academic achievement.

Although Nigerian scholarship has examined school leadership, facilities and ICT use, there remains a need for evidence that considers personnel management and technology management together within a broad regional sample. This study therefore asks whether the management of human and technological resources is significantly related to students' academic achievement in public secondary schools in North Central Nigeria.

2. Objectives and Hypotheses

The study sought to: (1) determine the relationship between human resource management and students' academic achievement; and (2) determine the relationship between technological resource management and students' academic achievement in public secondary schools in North Central Nigeria.

H01: There is no significant relationship between human resource management and students' academic achievement in public secondary schools in North Central Nigeria.

H02: There is no significant relationship between technological resource management and students' academic achievement in public secondary schools in North Central Nigeria.

3. Literature Review

3.1 Human Resource Management in Education

Human resource management in education encompasses recruitment, deployment, supervision, motivation, appraisal, professional development and retention of school personnel. Teachers are especially important because they translate curriculum and policy into classroom practice. Peretomode [2] emphasises the central role of educational personnel, while Ehiamekalor [7] links administration and supervision with effective school functioning. International evidence likewise identifies teacher effectiveness as an important component of school quality and student achievement [1].

Within the Nigerian context, leadership and supervisory practices have been associated with teacher job performance [8], [9]. Continuous professional development is also important because teachers must update subject knowledge, pedagogy and classroom-management skills as curricula, learner needs and technologies change. Human resource management is therefore not simply an administrative function; it is a mechanism through which school leadership can strengthen instructional capacity and the conditions under which learning occurs.

3.2 Technological Resource Management

Technological resource management concerns the acquisition, deployment, accessibility, regulation, utilisation, maintenance and upgrading of ICT and digital learning resources. The thesis instrument addressed regulated use of mobile phones, desktop computers, audio-visual materials and tablets in classroom, library, laboratory and field-trip contexts. Effective management is therefore broader than procurement: it includes rules of use, technical functionality, teacher competence and alignment with learning objectives.

Aduwa-Ogiegbaen and Iyamu [5] and Yusuf [6] identified infrastructural and institutional constraints to ICT integration in Nigerian schools. A systematic review by Tondeur et al. [10] further shows that teachers' beliefs, competence and school context interact in shaping technology use. More broadly, technology-supported learning tends to produce positive but heterogeneous effects [3], reinforcing the need to focus on the quality of implementation rather than the mere presence of devices.

3.3 Academic Achievement

Academic achievement refers to demonstrated attainment of learning objectives, commonly reflected in examination or assessment results. In the parent thesis, students' academic achievement was operationalised using grades in the Senior Secondary Certificate Examination conducted by the West African Examinations Council (WAEC), with a pro-forma used to harvest students' scores. This objective measure is preferable to treating respondents' opinions alone as the achievement outcome. School facilities, teacher effectiveness and instructional conditions have all been associated with academic performance in prior research [11], [12].

3.4 Theoretical Framework

The parent thesis considered observational learning theory and adopted goal-setting theory as its principal theoretical framework. Goal-setting theory, developed through the work of Locke and Latham, proposes that specific and appropriately challenging goals, accompanied by feedback and commitment, can direct attention and effort toward improved performance [13], [14]. Applied to school resource management, the framework suggests that school leaders can improve organisational performance when personnel responsibilities, professional-development priorities and technology-use expectations are clearly specified and monitored. The theory is relevant to this article because both human and technological resources require purposeful goals, feedback and coordinated implementation. Its limitation is that goal clarity alone cannot overcome structural constraints such as inadequate funding, electricity, connectivity or staffing; consequently, it is used as an organising rather than deterministic framework.

4. Methodology

4.1 Design, Population and Sample

A cross-sectional descriptive survey design was used. The population comprised 23,134 principals and teachers—487 principals and 22,647 teachers—in 487 public secondary schools across the six North Central states and the Federal Capital Territory. The parent study selected 49 schools, 49 principals and 2,264 teachers (2,313 respondents) using a reported simple-random 10% sampling procedure. Of the 2,313 questionnaires

distributed, 2,195 were retrieved and used, giving a response rate of 94.9%. The distribution of the planned sample is shown in Table 1.

Table 1: Planned sample distribution by state/FCT

State/FCT	Schools	Principals	Teachers
Benue	7	7	222
Kogi	7	7	324
Kwara	9	9	424
Nasarawa	8	8	395
Niger	5	5	205
Plateau	7	7	355
FCT Abuja	6	6	339
Total	49	49	2,264

Source: Parent thesis; sampling frame based on State Secondary Education Boards (2023).

4.2 Instrument, Validity and Reliability

Data were collected using the researcher-developed Questionnaire on Relationship between School Resource Management and Students' Academic Achievement (QRSRMSAA), together with a pro-forma for harvesting students' examination scores. The QRSRMSAA contained 24 items across the wider school-resource study and used a four-point scale: Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1. For this article, the analysis is limited to the human-resource items (1–5) and technological-resource items (15–18). Expert appraisal in Educational Management produced a reported logical validity index of 0.80. A pilot test involving 20 principals and teachers from two schools produced a split-half reliability coefficient of 0.82. These values are reported as coefficients (0.80 and 0.82), not percentages.

4.3 Data Collection and Analysis

The researcher and trained assistants administered the questionnaires after obtaining permission from the selected schools. Respondents were allowed three days to complete the instrument, and confidentiality was assured. Means and standard deviations were used to answer the research questions, with 2.50 as the decision benchmark on the four-point scale. Pearson's product-moment correlation coefficient was used to test the null hypotheses at $\alpha = .05$. The parent thesis contains inconsistent degrees-of-freedom statements in the correlation tables and accompanying prose; because the raw SPSS output was not supplied, the present article reports the correlation coefficients and the thesis-supported significance level without reproducing the conflicting degrees of freedom. This preserves the verified result while avoiding an unsupported numerical correction.

5. Results

The descriptive results for human resource management are presented in Table 2. All five items exceeded the 2.50 decision benchmark, with a cluster mean of 3.34. The highest mean was recorded for principals' positive interaction with teachers ($M = 3.44$), while the lowest was for encouragement of teachers to do their best ($M = 3.23$).

Table 2: Human resource management items ($n = 2,195$)

Item (abridged)	M	SD	Decision
Principal calmness/composure in relating to teachers	3.35	0.68	Agree
Positive interaction/smile with teachers	3.44	0.57	Agree
Readiness to apologise and model learning	3.37	0.68	Agree
Sensitivity to teachers' mood	3.33	0.69	Agree
Encouragement of teachers to do their best	3.23	0.79	Agree
Cluster mean	3.34	—	Agree

Source: Field Study, 2025.

For technological resource management, all four items also exceeded the benchmark, and the cluster mean was 3.37 (Table 3). The highest mean concerned regulated use of tablets/iPads for field-trip research ($M = 3.49$), followed by desktop computers in the library ($M = 3.39$).

Table 3: Technological resource management items ($n = 2,195$)

Item (abridged)	M	SD	Decision
Regulated mobile-phone use for classroom research	3.33	0.78	Agree

Item (abridged)	M	SD	Decision
Desktop-computer use for library research	3.39	0.67	Agree
Audio-visual resources for laboratory activities	3.33	0.75	Agree
Tablet/iPad use for field-trip research	3.49	0.59	Agree
Cluster mean	3.37	—	Agree

Source: Field Study, 2025.

The inferential results are summarised in Table 4. Human resource management had a positive correlation with students' academic achievement ($r = 0.364$, $p < .05$). Technological resource management showed the same reported coefficient ($r = 0.364$, $p < .05$). The two null hypotheses were therefore rejected. The coefficients indicate positive associations of modest-to-moderate magnitude; they do not establish causal effects.

Table 4: Correlation results for the two focal resource domains

Relationship	r	p	Decision
Human resource management $\times$ academic achievement	0.364	$< .05$	Reject H01
Technological resource management $\times$ academic achievement	0.364	$< .05$	Reject H02

Note: Coefficients and significance decisions are reproduced from the parent thesis. Conflicting degrees-of-freedom values in the thesis are intentionally not reproduced because the raw SPSS output was unavailable for verification.

6. Discussion

The positive relationship between human resource management and academic achievement supports the view that the quality of school personnel management is closely connected with instructional effectiveness. The result is consistent with evidence that teacher quality matters for student learning [1] and with Nigerian studies linking school leadership practices with teacher performance [8], [9]. In practical terms, supportive interaction, supervision, encouragement and professional development can strengthen the organisational conditions in which teachers work. However, because the study is cross-sectional, the result should be interpreted as an association rather than proof that human resource management caused higher achievement.

The positive relationship between technological resource management and academic achievement is also consistent with prior research. Nigerian studies have identified ICT as potentially valuable while emphasising persistent constraints in infrastructure, access and implementation [5], [6]. International evidence similarly indicates that educational technology can improve learning when it is integrated effectively [3]. The present finding is therefore better understood as support for managed and purposeful technology use—not simply device availability. The emphasis in the instrument on regulation and context-specific use is important because mobile devices and digital tools can support learning but may also distract from it or facilitate academic misconduct when poorly governed.

Taken together, the results are compatible with goal-setting theory [13], [14]: school resources are more likely to contribute to organisational objectives when expectations, responsibilities and feedback are clear. Human and technological resources also interact. Teachers require competence and support to use technology effectively, while technology requires maintenance, rules and instructional purpose. UNESCO's recent global assessment similarly cautions against treating technology as a stand-alone solution [4].

7. Conclusion

The study concludes that human resource management and technological resource management are positively and significantly related to students' academic achievement in public secondary schools in North Central Nigeria. The evidence supports an integrated approach in which teacher support, supervision and development are pursued alongside appropriate access to, regulation of and maintenance of digital technologies. The findings are correlational and should not be interpreted as causal or predictive effects.

8. Recommendations

1. Education authorities should strengthen teacher recruitment, deployment, supervision, welfare and continuous professional development, with particular attention to instructional competence and supportive school leadership.
2. ICT investment should cover not only procurement but also electricity, connectivity, maintenance, technical support, replacement planning and equitable access across schools.

3. Teachers and school administrators should receive regular, practical training on curriculum-aligned use of computers, audio-visual resources, mobile devices and digital learning platforms.
4. Schools should establish clear policies for responsible use of mobile and digital devices so that educational benefits are maximised while distraction and examination malpractice are minimised.
5. Future studies should retain objective examination outcomes, report complete raw statistical output, account for clustering of respondents within schools and, where prediction is intended, use multivariable or multilevel regression models.

9. Limitations

The study has four principal limitations. First, its cross-sectional design does not establish temporal or causal relationships. Second, the sample was clustered within 49 schools, while the reported bivariate correlation analysis did not document adjustment for school-level clustering. Third, the parent thesis contains inconsistent degrees-of-freedom values in the hypothesis-testing section; the raw SPSS output was not available to resolve that inconsistency. Fourth, the instrument's overall split-half reliability coefficient is reported, but domain-specific reliability coefficients for the human and technological subscales were not separately provided. These limitations should be considered when generalising the findings.

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