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Original Article

Software and Hardware Digital Skills Acquisition and Instructional Delivery of Office and Information Management Education Lecturers in South-South Nigeria

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Abstract: *The increasing integration of digital technologies into tertiary education has made software and hardware competence essential for effective instructional delivery. However, evidence on the digital competence of Office and Information Management (OIM) lecturers in South-South Nigeria remains limited. This study examined the relationship between software and hardware digital skills acquisition and instructional delivery among OIM lecturers in tertiary institutions across the six South-South states of Nigeria. A correlational research design was adopted, and all 123 OIM lecturers were studied using a census approach. Data were collected with validated questionnaires and analysed using descriptive statistics and Pearson Product Moment Correlation at the .05 significance level. Results indicated that lecturers performed well on frequently used productivity software and hardware but had limited competence with a range of specialist digital tools. The software digital skills were significantly and positively associated with instructional delivery (r =. 774, p <.05), and hardware digital skills showed even a larger positive association (r =. 837, p <.05). This study finds that digital competence in the form of both software and hardware application is an important predictor for OIM lecturers delivery, yet varies by specific technology use. It calls for more focused professional development programmes and technology-enabled teaching to be better supported by access to specialist digital infrastructure.*

Keywords: *Digital Skills Acquisition, Software Skills, Hardware Skills, Instructional Delivery, Office and Information Management, Tertiary Education.*

I. INTRODUCTION

The digital transformation of higher education has fundamentally reshaped the knowledge, skills, and pedagogical practices expected of university lecturers. At modern tertiary institutions, pedagogical success stands on disciplinary know-how but also rests upon the ability of teachers to meaningfully integrate digital technologies into teaching, learning, assessment and academic interaction. As a result, digital competence has changed from something that would be nice to have as part of professional practice and teaching into an unavoidable, necessary element affecting the quality of educational delivery in schools [UK] (Agboola et al., 2014; Edet, 2019) and ensuring graduates are prepared for workplaces increasingly driven by technology.

For Office and Information Management (OIM), a discipline traditionally identified with technology, these changes have special significance. OIM was originally focused on shorthand, typewriting, filing systems and office procedures and has slowly changed into a technology-heavy field that mirrors the digitisation of contemporary organisations. Modern office environments often utilise integrated digital platforms, cloud-based information systems, electronic document management and virtual collaboration technologies as well as automation in administrative processes. Owing to this, it is becoming a sort of expectation that OIM graduates must be equipped with various skills in diverse digital applications and technologies not limited to overused office requirements (Oyinloye, Asonibare and Oluwalola, 2021). Realising these learning outcomes relies heavily on the digital competence development of lecturers who are not only transmitters, but also facilitators and exemplars of technology-enabled practice in their professions.

Software and hardware operating skills are at the heart of this competence. Software competence is broader in scope than just general understanding of basic computer functionality and even includes the ability to use application programmes such as word processing, spreadsheets, presentation software packages, database management systems appropriately for teaching/ learning functions, including content development and information management. Conversely, hardware competency refers to the seamless use of physical technology through which digital instruction is delivered computers and peripheral devices such as printers, scanners, projectors, etc., such as interactive whiteboards (Inyang & Ekpenyong, 2012; Gurunath &

Samanta, 2022). While they are conceptually distinguishable, these competencies depend on each other to function in practice. Educational gains from software applications are contingent upon hardware that works, but hardware devices become pedagogically impotent without users who can exploit suitable software. As a whole, they represent the underpinning infrastructure of digital pedagogical knowledge (Mishra, 2015).

Pedagogically, software and hardware competence goes beyond merely being technically proficient. Lecturers who can demonstrate these competences are in a better position to develop interactive materials, conduct meaningful hands-on learning sessions, and offer timely feedback on assessment tasks and assignments that integrate into blended online environments using real-life workplace tools. In contrast, lack of competency could hamper teaching innovation, lessen classroom productivity as students learning experiences with technology are reduced and ultimately graduate employability may suffer in the face of increasingly tech-mediated organisational contexts.

Despite being a well-recognised need in higher education and some background studies examining the nature of these software hardware operating skills, it has not, together, provided an empirical appreciation in the Nigerian context by exploring their exact utility for actual content delivery in partnership with OIM lecturers. Existing works have mostly explored digital competence as a multi-dimensional construct alongside ICT utilisation, technological readiness, institutional support, digital literacy or e-learning adoption (Amesi et al., 2022; Ile & Abi, 2021). These studies are reflective and useful; however, they often treat software and hardware competence as part of a standalone set within broader digital capability, which confounds their association with instructional delivery. As a result, evidence is lacking about whether lecturers possess these foundational competencies at levels needed to support effective teaching or if variation in those competencies leads to substantial differences in instructional performance.

This knowledge gap is particularly important because software and hardware competencies represent prerequisite capabilities upon which more advanced forms of digital pedagogy depend. Competence in learning management systems, artificial intelligence tools, virtual collaboration platforms, online assessment technologies, and multimedia content development presupposes the ability to operate the underlying software applications and hardware infrastructure effectively. Thus, it is important to determine the degree of influence these competencies have on instructional strategy delivery when designing evidence-based capacity-building programmes that target essential institutional investments in digital infrastructure and more robust OIM education amidst fast-evolving technological landscapes.

Against this background, this study examined the relationship between software and hardware digital skills acquisition and the instructional delivery of Office and Information Management lecturers in tertiary institutions across South-South Nigeria. The study sought to:

1. determine the relationship between software digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria;
2. determine the relationship between hardware digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria.

The study was guided by the following research questions:

1. What relationship exists between software digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria?
2. What relationship exists between hardware digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria?

The following null hypotheses were tested at the 0.05 level of significance:

- H01: There is no significant relationship between software digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria.
- H02: There is no significant relationship between hardware digital skills acquisition and the instructional delivery of Office and Information Management lecturers in South-South Nigeria.

II. LITERATURE REVIEW

A) Conceptual Review

a. Software Digital Acquisition Skills

Software is the collection of programmes, procedures, and associated data that instruct a computer system how to operate, distinct from the physical hardware on which it runs (Mishra, 2015). It is conventionally divided into system software, which manages the computer's own operation operating systems such as Windows, Macintosh OS, and Linux and application software, which performs specific end-user tasks such as word processing, spreadsheet computation, database management, and desktop publishing (Inyang & Ekpenyong, 2012). Educational software constitutes a further, purpose-built category designed specifically for classroom use, whether projected to a shared display or run across a networked

laboratory (Mishra, 2015). Because software tools function as communication and interactive resources enabling collaboration, feedback, and content-sharing between lecturer and student their competent use has been linked directly to gains in students' academic learning and achievement (Beeland, 2017; Jubril, 2019). For OIM lecturers specifically, software fluency is not merely instrumental but curricular: the discipline's own accreditation objectives, as set by the National Universities Commission, expect graduates to be equipped with marketable skills in deploying business software embodied in the Microsoft Office suite and related compu-graphic packages, an expectation lecturers can model only if they themselves possess it (Ogiagah, 2009; Akomas, Ekeke, & Douglas, 2017).

b. Hardware Digital Acquisition Skills

Hardware denotes the tangible, external and internal devices and equipment that enable a computer system to perform input, output, storage, communication, and processing functions (Gurunath & Samanta, 2022). External or peripheral hardware -- printers, scanners, monitors, and keyboards controls input and output, while internal hardware such as the motherboard, processor, and memory is required simply for the machine to run (Agboola, Ademiluyi, & Ademiluyi, 2014). For OIM lecturers, hardware competence extends beyond passive operation to basic troubleshooting: recognising when a defective power supply, an overheating processor, or faulty peripheral connection is disrupting a lesson, and knowing simple remedial steps such as safe-mode diagnostics, is treated in the literature as integral to hardware digital skill rather than a separate technical specialism (Abid, Mohd, Mohd, & Rajiv, 2022; Ozdamli & Cavus, 2021). Devices most frequently implicated in OIM instructional contexts include printers, scanners, photocopiers, modems, compact-disc and digital-video-disc drives, fax and facsimile equipment, and interactive whiteboards, each carrying distinct operating and maintenance demands (Agboola, Ademiluyi, and Ademiluyi, 2014).

c. Instructional Delivery in Office and Information Management

Instructional delivery refers to the interaction among the lecturer, the student, the content, and the knowledge, skills, and dispositions students need in order to learn and to collaborate in a rapidly changing world it is operationalised through a repertoire of strategies for communicating academic content and sustaining student engagement (Ragan, 2011). Effective delivery, whether face-to-face or digitally mediated, is associated with logically organised material, consistent and concise presentation, and a deliberate use of visual and interactive elements to sustain attention (Moore, 2018; Simonson & Schlosser, 2019). For OIM programmes in particular, instructional delivery has been reframed by the sector's own accreditation philosophy, which expects lecturers to deploy business and computer-graphic software fluently as part of equipping graduates with marketable, employment-ready skills (Ogiagah, 2009). Where software and hardware competence are present, lecturers are better placed to vary delivery format, provide timely feedback, and sustain the engaging, technology-supported instruction the discipline's accreditation objectives anticipate; where such competence is absent, delivery reverts to more constrained, lecture-only modes regardless of the technology nominally available in the classroom (Koko & Ajinwo, 2022).

d. Theoretical Framework

This study is anchored on three complementary theories of technology adoption and use: the Technology Acceptance Model, the Technology-Organization-Environment framework, and Vygotsky's activity theory. The Technology Acceptance Model (TAM), propounded by Davis (1989), holds that an individual's intention to use a system is jointly determined by perceived usefulness the degree to which a person believes a technology will enhance performance and perceived ease of use the degree to which the technology is believed to be free of effort with usage intention mediating actual adoption behaviour. TAM was developed from the earlier Theory of Reasoned Action and remains among the most widely applied frameworks for explaining why lecturers, despite the acknowledged pedagogical value of digital tools, sometimes resist adopting them for classroom use. It supplies the present study's central lens for interpreting why digital-skill acquisition does not automatically translate into instructional use.

The Technology-Organization-Environment (TOE) framework, proposed by Tornatzky and Fleischer (1990), complements TAM by locating technology adoption within three contextual layers: the technological context the characteristics of the tools themselves, the organisational context institutional resources, structure, and readiness, and the environmental context the wider policy and infrastructural climate in which the institution operates. Applied here, TOE draws attention to the fact that a lecturer's digital-skill acquisition and its translation into instructional delivery are shaped not only by individual competence but also by institutional facilities and the broader South-South Nigerian infrastructural environment.

Vygotsky's (1978) activity theory contributes a socio-cultural dimension, viewing the human mind as constituted through a subject's interaction with the world rather than as an isolated cognitive processor. Tools -- including digital technologies -- mediate this interaction: rather than applying a natural function directly to a task, the learner interposes a technical or psychological tool between the function and the task. This perspective supports treating lecturers' digital skills

as mediating tools that reorganise, rather than merely supplement, the activity of instructional delivery, and it grounds the study's expectation that stronger digital-skill acquisition should be systematically associated with more effective instructional delivery practice.

B) Empirical Review

Oyinloye, Asonibare, and Oluwalola (2021) examined the office skills required by Office Technology and Management graduates for effective performance in modern offices in Kwara State using a descriptive survey of 152 respondents. Their results indicated that it was essential for graduates to be proficient in both technical and soft skills, especially in computer abilities/technology as well as presentation experience, and so on. The study also revealed that the acquisition of these competencies is dependent on access to adequate training facilities; hence, the authors recommend better supply of office equipment/computers and internet services in institutions at tertiary level. Amesi, Amaewhule and Akoku (2022) investigated the digital skills Business Education lecturers needed for teaching accounting courses in tertiary institutions in Rivers State, but their focus was on lecturers rather than graduates. Findings the study merged a census of 82 lecturers with variance analysis, which showed that software, hardware and audio-visual skills were all essential for successful delivery. It therefore called for consistent capacity building of lecturers with respect to modern digital laboratories. A similar study conducted by Koko and Ajinwo (2022) found the use of innovative technologies for teaching-learning delivery approach in the university context with Office Management and Technology programme in Rivers State. However, the study found wide use of digital platforms such as Zoom and Google Classroom by lecturers and students, but inadequate infrastructure delivery for education, with a limited range of available technologies technological readiness may have further stifled this integration into teaching at the system level due to continued institutional resistance.

When viewed holistically, the studies suggest that digital competence has become a fundamental requirement for effective teaching and learning of Office and Information Management Education– related Business Education programmes in the 21st century. They also suggest that the capability of lecturers to implement digital technologies is contingent not just on personal capabilities, but more broadly within institutional amenities and support. However, some issues remain open in light of the current evidence. Because most of the studies were single-state or, at best, multi-state, it is not clear whether their findings generalise to South-South more broadly. Furthermore, although they standardise the digital skills or technologies that lecturers employ in instructional affairs, they do not investigate how their software and hardware operational capabilities are related to instructional delivery. Consequently, the extent to which these foundational digital competencies are associated with lecturers' instructional effectiveness remains insufficiently established. This study addresses that gap by examining the relationship between software and hardware digital skills acquisition and instructional delivery among Office and Information Management lecturers across tertiary institutions in the six states of South-South Nigeria.

III. METHODS

This study adopted a correlational research design, considered appropriate because the objective was to determine the relationship between two digital-skill domains software skills and hardware skills -- and the instructional delivery practice of lecturers, rather than to manipulate either variable (Oguzo, 2024). The study was conducted in South-South Nigeria, a six-state geopolitical zone comprising Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers States. The population comprised all 123 lecturers teaching Office and Information Management (formerly Office Technology and Management) in the universities, polytechnics, and one federal college of education across the zone that offer the discipline as a course of study: 42 lecturers from six universities, 69 from five polytechnics, and 12 from one federal college of education. Because this population was of a manageable size, all 123 lecturers were studied by census; no sampling technique was applied.

Two researcher-developed instruments were used for data collection: the Digital Skills Acquisition and Instructional Delivery of Office and Information Management Lecturers Questionnaire (DSAOIMQ) and the Lecturers' Instructional Delivery Questionnaire (LIDQ). Both instruments were rated on a four-point scale of Strongly Agree, Agree, Disagree, and Strongly Disagree. The instruments were subjected to face and content validation by three validators two lecturers in Office and Information Management and one lecturer in Measurement and Evaluation who reviewed items for clarity and relevance and recommended modifications that were incorporated into the final instruments. Internal-consistency reliability was established using Cronbach's Alpha, yielding coefficients of 0.89 for the DSAOIMQ and 0.91 for the LIDQ, both considered adequate for the study. The instruments were administered by the researcher, assisted by two trained research assistants; all 123 copies distributed were retrieved, resulting in a 100 per cent response rate.

Data addressing the two research questions per variable pair were analysed using means and standard deviations, with a cut-off mean of 2.50 distinguishing agreement (skill possessed / practice engaged in) from disagreement. The two null hypotheses were tested using the Pearson Product Moment Correlation coefficient (r) at the .05 level of significance, with the Statistical Package for the Social Sciences (SPSS). A null hypothesis was rejected where the calculated r exceeded the critical

value at the stated degrees of freedom, indicating a statistically significant relationship between the digital-skill domain and instructional delivery; it was retained where the calculated r fell below the critical value (Oguzo, 2024).

IV. RESULTS

A) Research Question 1: Software Skills and Instructional Delivery

Table 1 presents the mean ratings of OIM lecturers' software operating skills and their corresponding utilisation in instructional delivery.

Table 1: Relationship of OIM Lecturers' Software Operating Skills and Instructional Delivery

Digital Skill Item	Skill Acquisition Mean	Instructional Delivery Mean	Remark
Word processor	2.43	2.10	Disagreed
Spreadsheets	2.97	2.10	Agreed
Power-point	3.12	2.61	Agreed
Desktop publishing	2.24	2.12	Disagreed
PDF	2.75	2.99	Agreed
Microsoft Excel	2.81	3.15	Agreed
Microsoft Word	3.41	2.79	Agreed
Graphics	2.41	2.36	Disagreed
Google Chrome	3.24	2.67	Agreed
Access	2.26	2.10	Disagreed
CorelDRAW	2.10	1.89	Disagreed
Grand Mean	2.70	2.52	Agreed

Source: *Field survey data, 2024 (extracted from Oguzo, 2024, Chapter Four)*

Table 1 shows that OIM lecturers' mean ratings on spreadsheets, presentation (PowerPoint), PDF readers, Microsoft Excel, Microsoft Word, and Google Chrome exceeded the 2.50 criterion mean on both skill acquisition and instructional-delivery utilisation, indicating agreement. By contrast, word processors generically, desktop publishing packages, graphics software, database (Access) software, and CorelDRAW fell below the criterion on both dimensions, indicating that lecturers neither strongly possessed nor strongly applied these more specialised tools. The grand mean of 2.70 for skill acquisition against 2.52 for instructional-delivery utilisation suggests that lecturers' software competence, in aggregate, translates into classroom use, though at a somewhat attenuated rate.

B) Research Question 2: Hardware Skills and Instructional Delivery

Table 2 presents the mean ratings of OIM lecturers' hardware operating skills and their corresponding utilisation in instructional delivery.

Table 2: Relationship of OIM Lecturers' Hardware Operating Skills and Instructional Delivery

Digital Skill Item	Skill Acquisition Mean	Instructional Delivery Mean	Remark
Printer	3.21	3.45	Agreed
Scanner	3.15	3.00	Agreed
Photocopier	2.99	2.89	Agreed
Scanner (repeat item)	2.80	2.67	Agreed
Fax machine	1.45	1.73	Disagreed
Modem	3.50	2.96	Agreed
Interactive whiteboard	1.78	2.79	Disagreed (skill) / Agreed (use)
Compact Disc (CD)	3.12	2.98	Agreed
Digital Video Disc (DVD)	3.40	3.12	Agreed
Facsimile (Fax)	1.23	2.13	Disagreed
Grand Mean	2.67	2.77	Agreed

Source: *Field survey data, 2024 extracted from Oguzo, 2024, Chapter Four*

Table 2 shows that lecturers' mean ratings for printers, scanners, photocopiers, modems, compact discs, and digital video discs exceeded the 2.50 criterion on both dimensions, indicating agreement. Fax machines and facsimile equipment fell below the criterion on both dimensions. The interactive whiteboard is a notable exception: lecturers rated their own operating skill below the criterion (1.78) while rating its use in instructional delivery above it (2.79) a pattern consistent with lecturers being pressed into using institutionally provided interactive whiteboards ahead of formal training on them, a discrepancy the discussion below returns to. The grand mean of 2.67 for skill acquisition against 2.77 for instructional-delivery utilisation indicates that, in aggregate, hardware skills translate into classroom use at least as fully as software skills.

C) Test of Hypotheses

Ho1: There is no significant relationship between software skill acquisition and instructional delivery of OIM lecturers in South-South Nigeria.

Table 3: Pearson Correlation -- Software Skill Acquisition and Instructional Delivery

N	123
df	121
Calculated r	0.774
Level of significance	.05
Decision on H_0	Rejected

Source: *Field survey data, 2024*

The calculated r of .774 exceeds the critical value at 121 degrees of freedom and the .05 level of significance. H01 is therefore rejected: there is a significant relationship between software skill acquisition and instructional delivery of OIM lecturers in South-South Nigeria.

H02: There is no significant relationship between hardware skill acquisition and instructional delivery of OIM lecturers in South-South Nigeria.

Table 4: Pearson Correlation -- Hardware Skill Acquisition and Instructional Delivery

N	123
df	121
Calculated r	0.837
Level of significance	.05
Decision on H_0	Rejected

Source: *Field survey data, 2024*

The calculated r of .837 exceeds the critical value at 121 degrees of freedom and the .05 level of significance. H02 is therefore rejected: there is a significant relationship between hardware skill acquisition and instructional delivery of OIM lecturers in South-South Nigeria.

V. DISCUSSION OF FINDINGS

The finding that OIM lecturers' software skills correlate significantly with instructional delivery (r = .774) aligns with Oyinloye, Asonibare, and Oluwalola's (2021) finding that technology, computer, and presentation skills are required for effective office performance, and with Amesi, Amaewhule, and Akoku's (2022) finding that Business Education lecturers require software skills for effective course delivery. The uneven acquisition pattern within the software domain strong competence in mainstream productivity tools (Word, Excel, PowerPoint, PDF readers, Chrome) but weak competence in more specialised packages desktop publishing, graphics, database software, CorelDRAW -- is consistent with the general observation that digital-skill development tends to concentrate around the tools lecturers use daily, while less frequently required software remains under-practised regardless of its curricular relevance (Mishra, 2015; Jubril, 2019).

The comparably strong hardware finding (r = .837) corroborates Amesi, Amaewhule, and Akoku's (2022) identification of hardware skills, alongside software and audio-visual skills, as a requirement for effective course delivery, and is consistent with Koko and Ajinwo's (2022) observation that infrastructural and readiness gaps, rather than the absence of demand, constrain fuller technology-supported delivery. The interactive-whiteboard discrepancy low self-rated operating skill paired with above-criterion instructional use is a useful illustration of the Technology-Organization-Environment framework's organisational and environmental contexts (Tornatzky & Fleischer, 1990): institutions appear to have placed interactive whiteboards into classrooms and instructional routines ahead of the individual skill development needed to operate them confidently, a mismatch between technological availability and lecturer readiness that is invisible if only adoption, rather than the underlying competence, is measured.

Read through the Technology Acceptance Model (Davis, 1989), the significant correlations for both software and hardware suggest that where OIM lecturers perceive these tools as useful and find them easy to use, they translate that perception into instructional practice; the gap on specialised software and on certain hardware devices suggests that perceived ease of use, specifically, remains the binding constraint on tools lecturers encounter less often. Vygotsky's (1978) activity-theory framing is likewise supported: software and hardware function here as mediating tools that reorganise, rather than merely supplement, the activity of instructional delivery, such that stronger tool competence is systematically associated with more effective delivery practice, exactly as the theory would predict.

VI. CONCLUSION

This study set out to determine the relationship between OIM lecturers' software and hardware digital skills acquisition and their instructional delivery in South-South Nigeria. The evidence supports a clear conclusion: both domains matter, and both matter significantly. Software skill acquisition and hardware skill acquisition each correlated strongly and significantly with instructional delivery, confirming that these two foundational digital-skill domains are not peripheral conveniences but substantive predictors of how effectively OIM lecturers teach. At the same time, the descriptive findings complicate a simple story of uniform digital readiness: competence clusters around mainstream, frequently used tools and thins out around specialised or less familiar ones, and at least one device -- the interactive whiteboard -- is being used in instruction ahead of lecturers' confidence in operating it.

Recommendations

Based on the findings, the following recommendations are made:

- Tertiary institutions in South-South Nigeria should organise targeted, tool-specific in-service training for OIM lecturers on the software packages where acquisition currently lags -- desktop publishing, graphics, and database applications in particular rather than generic digital-literacy workshops.
- Institutions that have deployed interactive whiteboards and similar hardware into OIM classrooms should pair that deployment with dedicated operating-skill training, so that instructional use does not continue to outrun lecturer competence.
- Curriculum planners and heads of department should periodically audit which software and hardware tools OIM lecturers are actually using in instructional delivery, so that training investment can be directed at the specific gaps this and similar studies identify rather than at digital skills in the abstract.
- Government and institutional authorities should sustain and expand the provision of standard office hardware printers, scanners, modems, and optical-disc devices given the strong relationship this study found between such devices and effective instructional delivery.

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