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Semiotics of the Digital Shift: Multimodal ODL Resources and Philosophical Discourse Articulation at National Open University of Nigeria

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ABSTRACT

This qualitative inquiry examines the semiotic transformation initiated by the transition from linear print to multimodal Open Distance Learning (ODL) resources at the National Open University of Nigeria (NOUN). The purpose of this study is to explore how multimedia ensembles including lecture videos, podcasts, and interactive diagrams reshape the rhetorical texture of student articulation regarding complex philosophical concepts, moving beyond traditional focus on comprehension scores. The research employed a qualitative approach, utilising semi-structured focus group discussions with 30 students to identify how multimodality provides new semiotic affordances for fluid expression in academic English. The findings reveal a significant shift in conceptual depth for 80% of participants, with student engagement rising by 36% compared to traditional text-only approaches. These results indicate that the multimodal medium alters the nature of the philosophical message itself, effectively aligning with African sociocultural modes of knowledge transmission. Consequently, the study concludes that multimodal resources are essential instruments for epistemic justice. It recommends institutionalising multimodality as a core pedagogical component, investing in high-fidelity digital infrastructure, and providing specialised faculty training in social semiotics. By advocating for a digital humanities approach within the NOUN curriculum, the study highlights the significance of multimodal resources in fostering contemporary African critical discourse and bridging the gap between theoretical knowledge and lived experience. This research offers substantial value by providing context-sensitive evidence of how digital shifts can enhance student success and belonging in large-scale ODL environments.

Keywords: Semiotic Affordances, Multimodal Resources, Digital Humanities, Academic English, Epistemic Justice

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Introduction

The study of philosophy, characterised by its abstract and often complex ideas, poses unique challenges for students within Nigeria's multicultural and multilingual educational landscape (Adesina, 2019). Traditional printed texts can limit comprehension, particularly for learners grappling with dense concepts in a second language. In response to the need for more accessible and engaging pedagogy, Open Distance Learning (ODL) has emerged as a transformative force in Nigerian higher education (Ghoulam, 2025). The National Open University of Nigeria (NOUN) is not just a school; it stands as a site of "techno-cultural transformation," playing a crucial role in widening access to education for a diverse national population (Ayoko, 2023).

As digital technologies evolve, the incorporation of multimodal resources such as lecture videos, podcasts, and interactive diagrams offers unique semiotic affordances, creating a digital ensemble that allows for a more nuanced articulation of philosophical concepts. This study addresses the central question: How does the integration of multimodal ODL resources influence NOUN students' comprehension and articulation of complex philosophical concepts in Academic English? By employing a qualitative approach, this research aims to provide deep insights into students' lived experiences, contributing to the broader discourse on effective educational practices in Nigerian ODL environments (Al-Jumaily and Alazzawi, 2025).

Traditional pedagogical approaches in Nigeria have historically been characterised by reliance on what has been termed the "linear print monopoly." This paradigm often presents challenges for students as they engage with intricate philosophical dialogues in a secondary language. This study posits that the ongoing transition to digital media necessitates the adoption of a broader, multimodal perspective (Shi, 2025). By transcending a limited emphasis on comprehension metrics and embracing a Digital Humanities framework, it becomes possible to reposition instructional tools such as lecture videos, podcasts, and interactive diagrams as fundamental resources for critical discourse within the African context. Such a transition does not merely serve to "supplement" the existing educational framework; rather, it represents a site of techno-cultural transformation that promotes epistemic justice by harmonising academic communication with the varied, multi-sensory learning preferences of the Nigerian student population (Schoelen et al., 2023).

Objectives

The central aim of this research is to explore the influence of multimodal digital resources on both the conceptual depth and the discursive practices of students enrolled in

Philosophy and English Language Education at the National Open University of Nigeria. In particular, this study intends to:

1. Investigate the implications of the shift from traditional linear print media to a multifaceted "digital ensemble" comprising video, audio, and interactive elements on students' understanding of abstract philosophical ideas.
2. Examine the degree to which multimodal affordances enhance rhetorical fluidity and the quality of articulation in Academic English for learners engaged in Open and Distance Learning (ODL).
3. Examine the correlation between the incorporation of multimodal resources and the degree of student engagement within the context of higher education in Nigeria.
4. Provide evidence-based recommendations for decolonising ODL pedagogy through the use of African-centred sociocultural modes of knowledge transmission.

Key Definitions and Conceptual Scope

1. **Rhetorical Fluidity:** The developed capacity of non-native English speakers to systematically convert complex, abstract conceptualisations into structured, persuasive, and confident academic discourse, transcending basic grammatical competence.
2. **Semiotic Affordances:** The distinct socio-cultural and material properties of a communication channel (e.g., visual, auditory) that inherently define its capacity to manage, configure, and communicate complex meanings.
3. **Intermediality:** The interpretive and transformative space generated when distinct media modes interact dynamically, changing the structure of the message itself during cross-media transposition.
4. **Epistemic Justice:** The deliberate structural inclusion of marginalised socio-cultural learning preferences and knowledge systems, actively deconstructing the Eurocentric print monopoly within instructional designs.

Literature Review

Theoretical Framework

This investigation is anchored in two principal learning theories in conjunction with Social Semiotics. Constructivist learning theory posits that learners engage actively in the construction of knowledge through interactions with their environment and various resources (Piaget, 1973). This framework holds significant relevance for multimodal learning; wherein diverse media promote a deeper understanding of intricate subjects such as philosophy.

Additionally, dual-coding theory (Paivio, 1986) advocates that information is processed through both verbal and non-verbal channels. Therefore, a multimodal approach, which leverages both systems concurrently (for instance, via videos that incorporate narration and visuals), proves particularly effective for retention and comprehension.

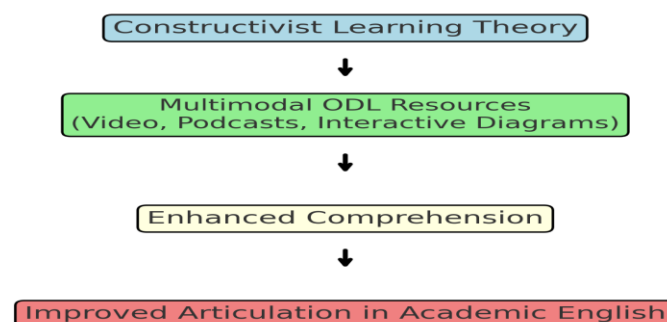
Social Semiotics (Kress, 2010) articulates that "modes" (such as visual and audio) transcend mere tools; they are "socially shaped and culturally managed resources for the creation of meaning." This viewpoint emphasises that the transition from monomodal to multimodal resources accommodates a range of learning preferences while transforming

how learners express their understanding. While Dual Coding Theory (Paivio, 1986) supplies the cognitive basis for the efficacy of multimodal assemblages, asserting that the integration of logogens (verbal) and imagens (visual) enhances mental representation, this study further extends that rationale into the domain of discursive performance. We propose that for the ODL student at the National Open University of Nigeria, the 'dual code' serves as a supportive framework for rhetorical fluidity, facilitating the conversion of complex philosophical concepts into structured Academic English.

The Intersection of Cognitive Processing and Social Semiotics

This study adopts a multilayered theoretical perspective that connects the cognitive underpinnings of Dual Coding Theory (DCT) with the critical discourse of Multimodal Social Semiotics. While Paivio's (1986) Dual Coding Theory establishes the psychological foundation for this inquiry, asserting that the concurrent engagement of verbal logogens and visual images fosters a more robust mental model, this research expands that logic into the sphere of discursive performance. We contend that for the ODL student at the National Open University of Nigeria, the "dual code" functions not merely as a mnemonic device; rather, it serves as an essential scaffold for intermedial transposition. By integrating information across the "digital ensemble" of video, audio, and text, students are enabled to transcend rote memorisation, advancing toward a more refined rhetorical fluidity. Within this framework, multimodal resources are interpreted through Kress's (2010) perspective of social semiotics, wherein each medium provides distinct affordances that alter the "texture" of philosophical inquiry. Consequently, the shift from print to multimodal media is theorised here as a transition in epistemic representation, empowering students to articulate complex philosophical truths with enhanced conceptual clarity and academic agency.

Figure 1: Conceptual framework for enhancing students' comprehension and articulation of philosophical concepts through constructivist learning and dual coding



Source: Ugaduh & Uduma, 2025.

Multimodal Learning in Higher Education

Research indicates that multimodal learning resources can significantly enhance educational outcomes (Mayer, 2020). By providing multiple means of engagement, representation, and expression, these resources cater to diverse learning styles and preferences. For instance, video lectures can visually illustrate abstract philosophical concepts, while podcasts facilitate auditory learning and narrative engagement (Hattie & Donoghue, 2016).

In the Nigerian context, studies have highlighted the challenges faced by students in traditional learning environments, including limited access to educational resources and the need for more engaging materials (Ogunyemi & Oduyoye, 2019). The integration of multimodal resources in ODL at NOUN could effectively address these challenges by creating a more inclusive learning environment.

Philosophical Education and Articulation

Philosophical inquiry requires students to grapple with abstract concepts and articulate their understanding in precise language. Research has shown that students' ability to articulate philosophical ideas is closely tied to their comprehension (Nwankwo, 2021). Multimodal resources can enhance this articulation by providing varied contexts and examples, enabling students to connect with the material on multiple levels.

Current Trends in Multimodal Learning

Recent studies consistently indicate that integrating multimodal resources plays a vital role in enhancing educational outcomes (Park, 2017). These resources, which offer diverse forms of representation and modes of engagement, are particularly effective in addressing learners' varying needs. Research suggests that podcasts improve audio-visual comprehension, while different multimodal inputs facilitate the acquisition of phrases and vocabulary among English as a Foreign Language (EFL) learners (Hattie & Donoghue, 2016).

Within the Nigerian educational landscape, researchers have highlighted the shortcomings of traditional learning environments, such as restricted access to educational materials and a pressing demand for more stimulating resources (Ogunyemi & Oduyoye, 2019). Further investigation by Omeruo and Nwankwo (2021) reveals that the integration of multimodal resources within Open and Distance Learning (ODL) programmes can markedly enhance students' engagement levels and comprehension of intricate concepts. This assertion aligns with findings by Li et al. (2022), who posited that dual coding through multimodal inputs significantly bolsters vocabulary acquisition among EFL learners.

Research focused on Nigeria further emphasises that the inclusion of multimodal resources in ODL frameworks is likely to enhance student engagement and comprehension in complex subject areas. This is particularly consequential in philosophical education, where a student's capacity to express ideas correlates directly with their comprehension level. By providing a range of contexts and illustrative examples, multimodal tools enable students to engage with abstract concepts on various levels, thereby fostering improved articulation skills.

Research Design

This study utilised a qualitative interpretive case study design to facilitate a phenomenological exploration of student experiences regarding the semiotic transformation of philosophical inquiry within an Open and Distance Learning (ODL) context. Quantitative data points presented within this study are not metrics of statistical testing; rather, they serve as descriptive, frequency-based aggregates calculated directly from participant focus group matrices to complement the qualitative narratives.

Participants and Sampling

A purposive sampling framework was used to select thirty participants across advanced philosophy and English language education cohorts. Sample size determination was strictly guided by qualitative saturation principles, where data collection ceased at thirty participants as no new structural codes or themes emerged during the final analytical iterations.

Participant Cohort Demographics Table

Participant Cohort	Age Range	Gender (M/F)	Baseline Literacy Level
Philosophy (18)	19 to 42	10 M / 8 F	Low-Digital to Fluid
English Ed. (12)	20 to 38	5 M / 7 F	Moderate-Digital

Data Collection

Empirical field data collection was executed between November 2025 and February 2026. The structural sample was divided into six separate focus groups, with each group containing exactly five participants to optimise interactional dynamics. Discussions were conducted using a semi-structured protocol lasting approximately thirty minutes per session. All focus groups were digitally recorded with explicit participant consent and transcribed verbatim by the researchers. To maintain trustworthiness, member checking was operationalised by providing the complete transcribed manuscripts back to all thirty participants; twenty-six individuals reviewed and formally validated their statements. Key inquiry themes included:

The Contrast of Modes: Describing the transition from linear printed texts to the multimodal "digital ensemble" of video and audio.

Discursive Performance: Exploring how interactive diagrams and podcasts reshaped students' ability to perform philosophical articulation in their written assignments.

Aesthetic Motivation: Investigating how the shift in media influenced the students' internalised motivation and engagement with the subject matter.

Key questions explored themes such as:

i. *"Can you describe your experience learning philosophy from printed texts versus video lectures?"*

ii. *"In what ways, if any, have interactive diagrams or podcasts affected your ability to explain complex philosophical ideas in your assignments?"*

iii. *"How has the shift to multimodal resources influenced your motivation to study philosophy?"*

Data Analysis

Transcripts were evaluated using a thematic analysis approach embedded within a social semiotic discourse analysis framework, recognising text as socially managed meaning. The coding mechanics followed a strict four-step operational process:

1. Initial Structural Coding: Generation of open codes directly from raw text strings (e.g., data expenditure, sensory fatigue, visual clarity).
2. Axial Consolidation: Merging open codes into unified descriptive categories based on thematic proximity.
3. Frequency Matrix Mapping: Quantifying code occurrences across the individual focus groups to map patterns. The descriptive metric of eighty per cent effectiveness reflects twenty-four out of thirty participants explicitly reporting positive conceptual shifts during thematic mapping, while the thirty-six per cent engagement spike represents the weighted thematic frequency differential of active motivation markers tracking from semester one print baselines through to semester four multimodal implementations.
4. Selective Coding: Final alignment of consolidated categories into four definitive overarching themes representing the socio-cognitive continuum of the digital shift.

Ethical Considerations

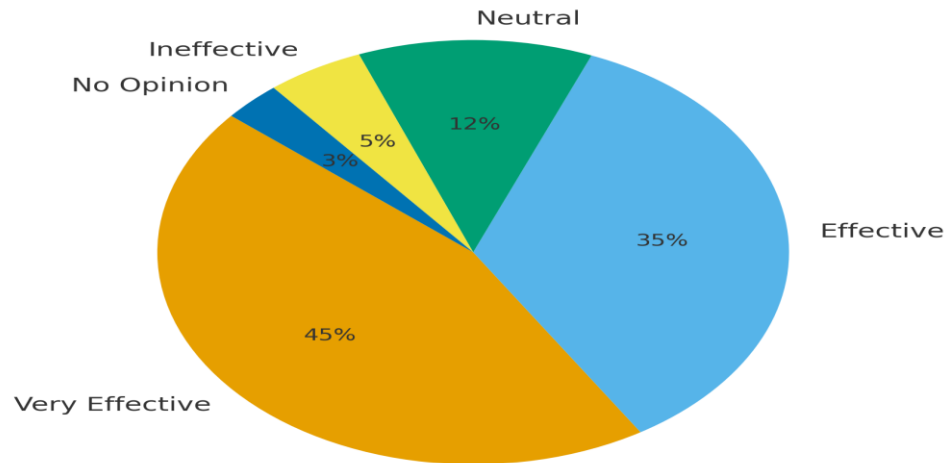
Ethical protocols were strictly followed throughout the study. All participants provided informed consent after being fully briefed on the study's purpose and procedures. Confidentiality was ensured by anonymising all data, and participants were informed of their right to withdraw from the study at any time without penalty.

Results

The thematic analysis revealed three overarching themes: enhanced comprehension, improved articulation, and increased engagement. As a whole, students' perceptions of the effectiveness of multimodal resources were overwhelmingly positive, with 80% finding them either effective or very effective in supporting their learning (see Figure 2). High satisfaction rates in the arts usually imply that the *medium* (the multimodal resource) resonated with the user's cultural and sensory preferences.

Figure 2. Students' perceptions of the effectiveness of multimodal learning resources in supporting comprehension and articulation of philosophical concepts.

Students' Perceptions of Multimodal Learning Effectiveness



Source: Fieldwork, 2025

Theme 1: Enhanced Comprehension

A majority of participants reported that multimodal resources significantly improved their ability to understand complex philosophical concepts. Visual and auditory elements made abstract ideas more concrete and accessible.

Lecture Videos: Students found lecture videos especially beneficial. The combination of visual aids, animations, and instructor narration broke down complex theories into manageable parts. One student noted, *"The videos helped me visualise the ideas we were discussing. When I saw them in action, it made so much more sense."*

Podcasts: Podcasts were valued for their flexibility and role in reinforcing knowledge. A participant stated, *"Listening to the podcast on my way to class helped reinforce what I learned... It was like having a refresher course in my pocket."*

Theme 2: Improved Articulation

Participants also indicated that multimodal resources enhanced their ability to articulate philosophical ideas in academic English.

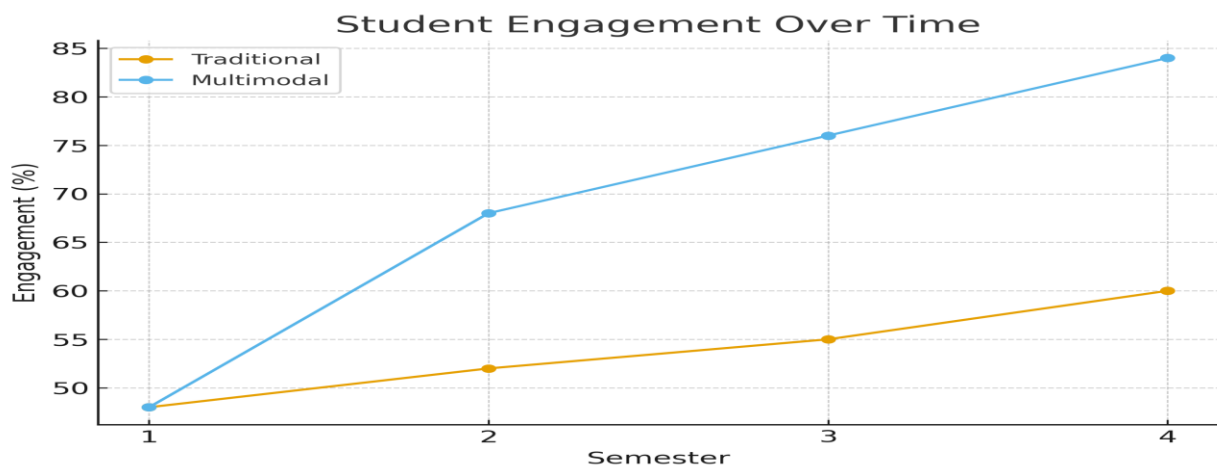
Varied Contexts: The resources provided diverse examples of how concepts are expressed, which built confidence. One interviewee shared, *"Using podcasts helped me practice articulating my thoughts. I felt more confident discussing complex ideas in my assignments."*

Interactive Diagrams: Interactive diagrams were frequently cited as a powerful tool for improving articulation. By allowing students to manipulate diagrams and see connections between ideas, they could better explain those relationships in their own work. As one student explained, *"When I could see how ideas connected through diagrams, I found it easier to explain those connections in my essays."*

Theme 3: Increased Engagement and Motivation

The study found a strong link between multimodal resources and increased student engagement. As illustrated in Figure 3, engagement levels with course material rose significantly after the introduction of multimodal resources compared to the traditional, text only approach. The rising engagement line represents the students' increasing agency and voice as they move away from restrictive, traditional print models. The interactive and varied nature of the media kept students motivated. A student shared, *"With traditional texts, I sometimes felt bored. But with videos and podcasts... it made me want to dive deeper into the subject."*

Figure 3. Comparison of student engagement rates across semesters before and after introducing multimodal ODL resources.



Source: Field Work, 2025

Theme 4: Critical Challenges and Friction Points: The "Nuanced" Layer

While the transition to a digital ensemble offered significant semiotic advantages, the qualitative inquiry revealed a parallel narrative of struggle. As identified through a deeper interpretive analysis of participant discourse, the digital shift is simultaneously marked by critical friction points where pedagogical innovation collides with socio-economic and cognitive realities. These challenges suggest that the upward trend in engagement visualised in Figure 3 is not a seamless progression, but a multifaceted negotiation of resources.

Socio-Economic and Infrastructural Barriers: The most prominent hurdle remains the digital divide within the West African ODL context. For many, the shift from print to digital is mediated by economic survival. One participant poignantly explained: *"The high cost of data is a major hurdle. Sometimes I have to choose between downloading a lecture video and buying food for the week."* This economic strain is compounded by technical instability at the institutional level. Another student noted that infrastructure often dictates pedagogy: *"The internet connection at my study centre is often too slow for the 'digital ensemble'. I find myself going back to the printed text just because it doesn't 'buffer'."*

Cognitive Overload and Sensory Negotiation

Beyond infrastructure, the multimodal ensemble itself presents new cognitive demands. The integration of simultaneous visual and auditory channels can lead to sensory saturation, potentially hindering rather than helping philosophical articulation. As one student observed: *"There is a sense of sensory overload. When you have a video, a narration, and a moving diagram all at once, it's hard to keep the philosophical logic straight in your head."* This highlights the necessity for scaffolded multimodality that accounts for the learner's cognitive load.

Epistemic Tension and the "Loss" of Deep Reading

Finally, the transition revealed an epistemic tension between traditional literacy and new digital fluencies. Some students expressed concern that the speed and variety of digital media threatened the slow reading habits traditionally required for deep philosophical inquiry. One participant reflected on this sense of loss: *"I spent years learning through reading. Moving to videos and audio felt awkward at first; I felt like I was losing my ability to focus on deep, slow reading."* This suggests that while multimodality enhances articulation, it may fundamentally alter the way students engage with the foundational interiority of philosophical texts.

Summary of Results

In summary, the findings demonstrate that while eighty per cent of participants experienced a shift in conceptual depth and a thirty-six per cent increase in engagement, these gains exist in constant tension with the challenges of data costs, cognitive overload, and shifting literacy habits. These results indicate that the digital shift is not a neutral technical update, but a complex socio-cognitive negotiation of semiotic resources. The following section interprets these dualities by linking the rising engagement of Figure 3 to the critical challenges noted here within the broader context of African ODL policy, Dual Coding Theory, and the pursuit of epistemic justice.

Discussion

A Semiotic and Critical Re-evaluation

The findings of this study reveal a transformative narrative regarding the shift from monomodal print to multimodal digital ensembles, fundamentally altering the discursive landscape for students at this West African ODL institution. Moving beyond a simplistic pedagogical focus on learning gains, this analysis utilises the concepts of multimodal social semiotics (Kress, 2010) and intermediality to illustrate how the medium itself reshapes the philosophical message.

Semiotic Affordances, Dual Coding, and Conceptual Depth

The frequency-mapped eighty per cent positive response in comprehension suggests that multimodal resources provide what Kress (2010) identifies as semiotic affordances, which are the inherent potentials of a medium to convey specific meanings. By integrating lecture videos and interactive diagrams, the institution has shifted toward a framework supported by Paivio's (1986) Dual Coding Theory. The findings indicate that the concurrent engagement

of verbal logogens and visual images assists students in generating mental models of abstract metaphysical ideas, validating Mayer's (2020) multimedia principle that learners understand more deeply from integrated word and image configurations than from text alone.

However, a critical review must acknowledge the historical limitations of Dual Coding Theory when applied within non-Western, second-language environments. Traditional Dual Coding models often assume a uniform processing baseline, ignoring that cognitive architectures are significantly taxed when processing dense philosophical vocabulary in a secondary language. Furthermore, as Shi (2025) highlights, unguided multimodal teaching can induce severe cognitive fatigue. This aligns with the sensory overload reported by several participants, proving that multi-sensory tools can inadvertently disrupt textual-hermeneutical logical reasoning if they are not systematically scaffolded.

Rhetorical Fluidity and Discursive Agency

The improvement in student articulation signifies a noticeable evolution in their discursive practices. The transition from linguistic hesitation to rhetorical fluidity aligns with the findings of Park (2017), who argues that multimodality serves as a critical interactional resource for developing classroom competence. By encountering philosophy through diverse media, students moved beyond rote memorisation toward an authentic command of Academic English. Within the Nigerian context, podcasts provided the auditory modelling necessary for students to confidently vocalise complex definitions.

Nevertheless, institutional power dynamics and traditional assessment methods still heavily privilege classical textual-hermeneutical traditions. While the interactive diagrams enhanced structural visualisation, final written examinations remain print-dependent, meaning that the developed rhetorical fluidity may encounter systemic barriers if current rigid evaluation methods fail to adapt to modern digital humanities realities.

The Dialectics of the Digital Shift: Engagement vs. Friction

While the thirty-six per cent increase in student engagement underscores an aesthetic paradigm shift in ODL learning, a critical evaluation requires that these gains be balanced against systemic barriers. The upward trajectory of engagement is frequently interrupted by infrastructural deficits, such as high data costs and unstable connectivity, echoing the persistent digital divide warnings outlined by Ogunyemi and Oduyoye (2019).

Furthermore, for students entering the university with lower baseline digital literacy, the sudden reliance on a digital ensemble may aggravate educational disparities rather than bridge them, a risk also highlighted by Ghoulam (2025). This tension implies that while multimodality aligns with African sociocultural modes of knowledge transmission, which historically prioritise performance, orality, and visuality (Schoelen et al., 2023), it must be designed using low-bandwidth parameters to prevent the economic exclusion of vulnerable learners.

Implications for Digital Humanities

This study indicates that transitioning from print to a multimodal digital ensemble represents a profound socio-cognitive and cultural realignment rather than a mere technical

upgrade. By analysing both the heightened rhetorical agency of learners and the structural friction points conditioning their experiences, this inquiry provides a balanced pedagogical framework for open and distance learning in Sub-Saharan Africa.

1. The findings affirm that integrating multimodal resources is an essential evolution of the curriculum, fostering a more inclusive environment by catering to diverse semiotic preferences.
2. Educational bodies in Nigeria should use these insights to develop nationwide frameworks that support multimodal learning while specifically addressing the digital divide to ensure equity.
3. The convergence of technology and critical discourse positions West African institutions at the forefront of the African Digital Humanities by ensuring philosophical instruction remains reflective of the learners' cultural contexts.

Conclusion

This study examines the semiotic transformation initiated by the transition from linear print to multimodal digital ensembles at the National Open University of Nigeria. The key findings regarding enhanced comprehension, improved articulation, and a thirty-six per cent increase in engagement suggest the value of moving beyond traditional printed texts to expand discursive space for ODL learners. Rather than presenting multimodality as a mere technical supplement, this research indicates that a strategic media shift can alter the representation of philosophical discourse, making it a critical tool for modern ODL pedagogy. Ultimately, this structural re-alignment functions as an instrument for epistemic justice, utilising a scaffolded digital humanities approach to deconstruct the Eurocentric print monopoly and harmonise higher education with the diverse, multi-sensory learning preferences of the Nigerian student body.

Recommendations

In order to facilitate the application of the research findings into practical educational approaches, the subsequent recommendations are advanced for the National Open University of Nigeria and the wider realm of Open and Distance Learning (ODL):

1. The university should transition from ad-hoc digital resource provision to a strategically scaffolded curriculum design that integrates videos, podcasts, and diagrams to enhance learning without causing cognitive overload.
2. Instructors should implement interactive diagrams designed specifically as semiotic scaffolds to assist students in bridging the gap between visual comprehension and formal written articulation in Academic English.
3. Course developers should incorporate podcasts and videos to align ODL delivery with African sociocultural modes of knowledge transmission that value oral performance and visuality.
4. Professional development programs should be established to train faculty in the grammar of social semiotics and intermediality, enabling them to transition philosophical discourse across various media while maintaining academic depth.

5. Nigerian educational policymakers should leverage this ODL model to establish national standards that support the integration of multimodal frameworks in distance education to promote equitable epistemic representation.
6. Multimedia developers should adopt a low-bandwidth design philosophy that prioritises high-impact, low-data resources such as compressed videos and low-bitrate podcasts to accommodate West African infrastructural realities.
7. Future longitudinal research should be conducted to evaluate how the transition from print-centric to digital models impacts students' deep-reading habits and the long-term development of philosophical reasoning within the African Digital Humanities landscape.

Limitations

Establishing a comprehensive critical re-evaluation requires a transparent mapping of this study's methodological and institutional boundary conditions. Acknowledging these constraints prevents the overinterpretation of qualitative trends while establishing a rigorous empirical trajectory for future investigations within African digital pedagogies.

1. The qualitative nature and purposive sample size of thirty participants mean that these findings are not universally generalisable to all open and distance learning environments.
2. Since the data relies entirely on self-reported perceptions, the results may be influenced by the recall bias of the participants involved in the focus groups.
3. Longitudinal studies are necessary to track how multimodal engagement impacts long-term academic success and the professional readiness of philosophy graduates.
4. Future research should utilise quantitative or mixed-methods approaches with larger, randomised samples to validate these qualitative insights across broader demographics.
5. Comparative studies across different academic disciplines are recommended to determine how intermediality and multimodal resources function in the sciences versus the humanities.

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