



## Communicating the Science of Audiovisual Production in a Challenging Digital Media Ecosystem: Federal University Otuoke Perspective

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### ABSTRACT

The digital media ecosystem is rapidly evolving, presenting significant challenges for effectively communicating the complex science underpinning audiovisual production. This study focuses on Federal University Otuoke, Bayelsa State, Nigeria, to examine how this scientific foundation is being conveyed within its audiovisual production programmes. The study adopted the constructivist learning theory, Digital Generative Multimedia Tool Theory (DGM TT), and the Technology Acceptance Model (TAM) to examine how students build knowledge and their perceptions of technology's role in audiovisual production. A mixed-methods approach was employed, utilizing a survey alongside Key Informant Interviews (KII) Findings revealed among others, a reliance on practical, hands-on training with limited explicit instruction on the scientific principles. Challenges identified include insufficient resources, large class sizes, and a perceived disconnect between theoretical concepts and practical application Current practices at Federal University Otuoke demonstrate a need for greater emphasis on integrating scientific principles into the curriculum for communication and media studies in the University. This study provides a localized perspective on the challenges of communicating audiovisual science within a Nigerian university context, contributing to a broader understanding of pedagogical approaches in developing countries. The research recommends curriculum revisions to explicitly incorporate scientific concepts, investment in updated audiovisual laboratory equipment, establishment of Faculty of Communication and Media Studies in Federal University Otuoke, and professional development opportunities for the faculty of Humanities of the University to enhance their understanding and teaching of these principles

## INTRODUCTION

The contemporary digital media ecosystem is characterised by rapid technological advancements and an increasing demand for skilled audiovisual professionals. However, proficiency in operating software and hardware is insufficient; a fundamental understanding of the scientific principles underpinning audiovisual production, encompassing the physics of sound, optics, digital signal processing, and colour theory – is crucial for innovation, problem-solving, and adaptation to emerging technologies (Ndolo, 2009; Owuamalam & Owuamalam, 2018). This is particularly vital in the context of higher education, where institutions are tasked with preparing future media practitioners for a dynamic and competitive industry. Against this background, the current study investigates the communication of these scientific principles within the audiovisual production programmes at Federal University Otuoke (FUO), Bayelsa State, Nigeria, a context often characterised by resource constraints and pedagogical challenges. The research aims to identify current practices, challenges, and potential strategies for enhancing the integration of scientific knowledge into the curriculum.

### *Statement of the Problem*

The rapid evolution of the digital media ecosystem presents a significant challenge to audiovisual production education. While technological advancements have democratised access to production tools, a concerning gap persists between the practical application of these tools and a comprehensive understanding of the underlying scientific principles that govern them (Block, 2010; Rumsey & McCormick, 2002). This deficiency extends beyond mere technical proficiency; it impacts creative innovation, effective problem-solving, and the ability to adapt to emerging technologies within the field (Church, S.A, 2007; Mamer, 2009; Asemah, 2011).

Within the Nigerian context, and specifically at Federal University Otuoke (FUO), this problem is exacerbated by several factors. Existing literature suggests that Nigerian media education often prioritises skills-based training over theoretical foundations (Omoera et al., 2017; Nkwam-Uwaoma & Onu, 2018; Omenugha et al., 2019). According to Pate (2023), this emphasis, while valuable for immediate employability, can result in graduates lacking the critical scientific literacy necessary to fully exploit the potential of digital audiovisual technologies. Owuamalam & Owuamalam, (2018) observe that resource constraints, including limited access to modern laboratory equipment and large class sizes, hinder the effective delivery of in-depth instruction on subjects such as acoustics, optics, and digital signal processing.

Preliminary observations at FUO indicate that students in the Departments of Journalism and Media Studies), English and Communication Studies (ECS), and Theatre and Film Studies (TFS) frequently demonstrate competence in operating industry-standard software and hardware, yet struggle to articulate the scientific rationale behind the techniques they employ (Onyejelem et al., 2023; Aondover et al., 2025b). This disconnect is further compounded by a perceived lack of integration of scientific principles within the existing curriculum, as evidenced by anecdotal feedback from both students and faculty.

Consequently, there is a risk that graduates from FUU, despite possessing practical skills, may be ill-equipped to address complex technical challenges, innovate effectively, or contribute meaningfully to the advancement of the audiovisual industry. This situation not only limits their individual career prospects but also potentially hinders the development of a robust and technologically advanced media sector within Nigeria. Therefore, a systematic investigation is required to assess the current state of science communication within FUU's audiovisual production programmes, identify the specific challenges faced by both lecturers and students, and propose evidence-based strategies to enhance the integration of scientific principles into the curriculum.

### ***Objectives of the Study***

The general objective of this study is to examine how scientific principles are being conveyed within its audiovisual production programmes at Federal University Otuoke.

Specifically, the research aims to;

1. assess the current methods of communicating the science of audiovisual production at Federal University Otuoke;
2. identify challenges faced by both instructors and students in this communication process;
3. propose strategies to enhance the integration of scientific principles into the curriculum.

### ***Research Questions***

Based on the stated objectives, the following research questions will guide this study:

#### ***1. Assessing Current Methods of Communication:***

- What are the current pedagogical approaches employed at Federal University Otuoke to communicate the scientific principles underpinning audiovisual production (e.g., acoustics, optics, digital signal processing) within the Departments of Journalism and Media Studies, English and Communication Studies, and Theatre and Film Studies?
- To what extent is explicit instruction on the scientific foundations of audiovisual techniques integrated into the existing curriculum of these departments?
- How do instructors perceive the balance between practical skills training and scientific theory instruction in their audiovisual production courses?
- What types of resources (e.g., laboratory equipment, software, learning materials) are currently available at FUU to support the teaching and learning of the science of audiovisual production?

#### ***2. Identifying Challenges in the Communication Process:***

- What challenges do lecturers at FUU face in effectively communicating the scientific principles of audiovisual production to students? (e.g., resource limitations, student preparedness, curriculum constraints)
- What challenges do students at FUU encounter in understanding and applying the scientific concepts related to audiovisual production? (e.g., perceived relevance, difficulty of concepts, lack of foundational knowledge)

- How do large class sizes impact the ability of instructors to provide individualized attention and facilitate effective science communication in audiovisual production courses?
  - To what extent do students' perceptions of technology (as informed by the Technology Acceptance Model - TAM) influence their engagement with and understanding of the scientific principles underlying audiovisual tools and techniques?
  - How do students' learning styles and prior knowledge (as informed by constructivist learning theory) affect their ability to construct understanding of the science of audiovisual production?
3. *Proposing Strategies for Curriculum Enhancement:*
- What specific strategies could be implemented to enhance the integration of scientific principles into the audiovisual production curriculum at FUUO? (e.g., revised course content, hands-on laboratory exercises, industry collaborations)
  - How can Digital Generative Multimedia Tools (DGMTT) be effectively leveraged to facilitate student learning and engagement with the scientific concepts underpinning audiovisual production?
  - What professional development opportunities would be most beneficial for FUUO faculty members to improve their understanding and teaching of the science of audiovisual production?
  - What infrastructural improvements (e.g., equipment upgrades, laboratory renovations) are necessary to support the effective communication of scientific principles in audiovisual production courses?

These research questions are formulated in line with the study's objectives and theoretical framework, so as to provide a focused direction for data collection and analysis.

## LITERATURE REVIEW

This conceptual review explores the theoretical underpinnings and existing literature relevant to communicating the science of audiovisual production, particularly within the context of a developing nation's higher education system like that of Nigeria and, specifically, Federal University Otuoke (FUO). It examines the inherent scientific basis of audiovisual production, the pedagogical approaches best suited for its effective communication, and the challenges faced in a resource-constrained environment.

### *The Scientific Foundations of Audiovisual Production*

Audiovisual production is inherently rooted in scientific disciplines. Sound recording and reproduction rely on principles of acoustics and signal. (Block 2010) avers that cinematography and video production depend on optics, light manipulation, and digital imaging techniques. According to Rumsey & McCormick (2002), post-production processes, such as editing and colour grading, involve complex algorithms and mathematical transformations. Similarly, cinematography and video production are fundamentally based on optics, the behaviour of light, and digital imaging techniques, which necessitate an understanding of sensors, resolution, and colour spaces.

Okoye & Onyejelem concur that post-production processes, including editing, colour grading, and visual effects, employ complex algorithms and computational methods. Mammer (2009) notes that a lack of understanding of these underlying scientific principles can lead to suboptimal production quality, limited creative innovation, and an inability to troubleshoot technical issues effectively.

### ***The Dynamics of the Science of Audiovisual Production***

The science of audiovisual production is a multidisciplinary field that combines technical, artistic, and communicative elements to create compelling visual and sound content. Zettl (2009) avers that in the contemporary digital media ecosystem, understanding the underlying dynamics of scientific principles is a sine qua non for effective communication, especially within challenging environments where technological, economic, and social factors influence production processes

According to Owuamalam (2001) cited in Onyejelem (2024) audiovisual production involves the integration of various technical skills, including cinematography, editing, sound engineering, and visual effects, within a framework that emphasises storytelling and audience engagement. Akpan & Ojo (2018) identify that the scientific basis of audiovisual processes relies heavily on principles from physics, such as light and sound propagation, as well as computer science, with the advent of digital technology allowing for greater manipulation and realisation of content. Chinda (2004) observe that the evolution of digital tools has transformed audiovisual production from traditional film and television practices to a more flexible and accessible digital paradigm, enabling producers to innovate with less reliance on costly equipment.

The advent of digital media ecosystems as noted by Aondover et al. (2025b) has introduced new dynamics, including decentralisation of content creation, real-time broadcasting, and interactive engagement, which challenge conventional paradigms. These shifts demand an understanding of not only the technical aspects but also the socio-cultural implications of audiovisual content. (Okoye & Onyejelem, 2016). Producers now operate within a rapidly changing environment characterised by competition for attention, algorithm-driven content distribution, and audience fragmentation.

In the context of academic and institutional settings, such as at the Federal University of Otuoke, a deep understanding of these scientific and technological dynamics is essential for training students and researchers to operate effectively within this ecosystem. According to Devin SuperTramp (2023) in Onyejelem (2024), the science of audiovisual production encompasses continuous learning about emerging technologies such as 4K and 8K resolution, virtual reality (VR), augmented reality (AR), and artificial intelligence (AI), all of which are reshaping how content is created, manipulated, and disseminated.

From the foregoing, the science of audiovisual production is characterised by its inherently interdisciplinary and evolving nature. To navigate the challenges of a digital media ecosystem, practitioners and scholars must stay abreast of technological advances, while understanding the socio-cultural

impacts of their work, thus, ensuring the effective communication of ideas, narratives, and knowledge in a dynamically shifting media landscape.

### ***Pedagogical Frameworks for Effective Science Communication***

Effective communication of scientific concepts requires a shift from traditional, didactic teaching methods to more student-centred approaches. **Constructivist learning theory** (Vygotsky, 1978) posits that learners actively construct their own understanding through experience and reflection. This suggests that practical exercises, coupled with explicit explanations of the scientific concepts involved, are more effective than passive lectures. Students learn best when they can apply theoretical knowledge to real-world scenarios, fostering deeper understanding and retention.

Complementing constructivism, the **Digital Generative Multimedia Tool Theory (DGMTT)** (Onyejelem & Aondover, 2024b) highlight the potential of digital tools to enhance learning. DGMTT suggests that interactive simulations, virtual reality environments, and multimedia resources can provide immersive experiences that facilitate the understanding of complex scientific concepts. According to Onyejelem et al (2024), audiovisual production itself provides a fertile ground for applying DGMTT, allowing students to experiment with different techniques and observe the resulting effects.

Similarly, the **Technology Acceptance Model (TAM)** (Davis, 1989) provides a framework for understanding how students perceive and adopt new technologies. TAM suggests that perceived usefulness and perceived ease of use are key determinants of technology acceptance. If students perceive the scientific principles as irrelevant or too difficult to grasp, they are less likely to engage with them. Therefore, it is crucial to demonstrate the practical benefits of understanding the science behind audiovisual production.

### ***Challenges in Nigerian Media Education***

The Nigerian higher education system, including FUU, faces significant challenges that impact the effective delivery of audiovisual production education. Resource constraints are a pervasive issue, with limited access to modern laboratory equipment, software, and qualified personnel (Pate, 2012). Large class sizes further exacerbate these challenges, making it difficult for instructors to provide individualized attention and facilitate hands-on learning.

Existing literature suggests a tendency in Nigerian media education to prioritize skills-based training over theoretical foundations (Pate, 2023). While practical skills are undoubtedly important, a lack of scientific literacy can hinder innovation and limit graduates' ability to adapt to the rapidly evolving digital media landscape. Onyejelem (2020) emphasizes the need for bridging the gap between academia and industry, suggesting that internships and collaborative projects can provide students with real-world experience and expose them to the practical applications of scientific knowledge.

### ***The Digital Media Ecosystem and its Implications***

The contemporary digital media ecosystem is characterised by constant technological advancements, including the rise of artificial intelligence, virtual reality, and augmented reality. These technologies are transforming audiovisual production, creating new opportunities but also demanding a higher level of scientific literacy. Professionals in the field must be able to understand and adapt

to these changes, requiring a strong foundation in the underlying principles of digital signal processing, computer graphics, and data analysis (Oduh & Nwammuo, 2008; Onanuga, 2010).

The increasing prevalence of online content creation and distribution also necessitates a greater emphasis on quality control and technical proficiency (Omenugha et al., 2019). Understanding the science of audio and video compression, streaming protocols, and digital rights management is crucial for ensuring that content is delivered effectively and securely.

### ***Overview of a Challenging Digital Media Ecosystem***

The digital media ecosystem is characterised by its rapid evolution, technological innovation, and widespread accessibility, transforming how content is created, distributed, and consumed globally. While this unprecedented growth offers significant opportunities for communication, education, entertainment, and cultural preservation, it also presents numerous challenges that complicate sustainable and effective media practices.

One of the primary challenges is the issue of **information overload and audience fragmentation**. The vast volume of available content, combined with personalised algorithms used by social media platforms, leads to highly fragmented audiences. This makes it difficult for content creators and institutions to reach their target demographics effectively and maintain consistent. In the submission, scholars like Lobato & Thomas (2018); Muhammad (2019) highlight that the proliferation of short-form videos and fleeting digital trends often prioritizes viral content over substantive, meaningful communication.

Another significant challenge lies in **technological obsolescence and digital infrastructure disparities**. Rapid advancements in technology, such as virtual reality (VR), augmented reality (AR), and AI-driven content generation, demand continuous investment and upskilling from media professionals. However, many regions and institutions, especially in developing countries, lack the necessary infrastructure and resources, thereby widening the digital divide. This disparity according to Vitalis, et al (2023) hampers equal participation and access, perpetuating broader socio-economic inequalities.

The **security and ethical concerns** within the digital media environment are also pressing. Issues such as digital piracy, copyright infringement, misinformation, and cyber threats undermine the integrity of digital content and threaten intellectual property rights. Diri & Diri (2019) concur that the proliferation of fake news and deepfake technologies exacerbates misinformation, influencing public opinion, political processes, and social stability.

Another challenge to digital media ecosystem is the constraint of privacy and data protection. The digital ecosystem relies heavily on data collection and user profiling to deliver targeted content and advertising; however, this raises concerns about user privacy, data misuse, and regulatory compliance. Recent data breaches and privacy scandals have heightened public awareness and skepticism regarding digital media practices.

Finally, **regulators and policymakers face uncertainty** as a result of regulatory and policy frameworks that lag behind technical advancements. UNESCO (2019) states that attempts to defend consumers, uphold ethical standards, and combat harmful information are hampered by the lack of clear, consistent legislation.

Despite encouraging creative communication and widespread content distribution, the digital media ecosystem as stated by Diri (2023), presents significant obstacles due to its dynamic and intricate structure. The development of a robust, just, and moral digital environment necessitates concerted efforts from governments, media outlets, technologists, and viewers.

### ***Theoretical Frameworks***

The study was anchored on the frameworks of constructivist learning theory, Digital Generative Multimedia Tool Theory (DGMTT), and the Technology Acceptance Model (TAM). The adoption of Constructivist Learning Theory proposed by Vygotsky (1978), DGMTT postulated by Onyejelem & Aondover (2024a; 2024b) as the theoretical frameworks for this research is strategically justified by their complementary strengths in explaining how students learn, engage with technology, and construct understanding within the context of complex, technically-driven disciplines like JMS, ECS, and TFS at FUU. ***Constructivist Learning Theory: A Foundation for Understanding Knowledge Construction***

Audiovisual production is not simply about mastering technical skills; it requires a deep understanding of the underlying scientific principles and the ability to apply them creatively. Constructivist learning theory (Vygotsky, 1978) provides a robust framework for understanding how students actively construct this knowledge. Unlike traditional, passive learning models, constructivism emphasizes the importance of experience, reflection, and social interaction in the learning process. This is particularly relevant to audiovisual production, where hands-on experimentation and collaborative problem-solving are essential. Therefore, adopting a constructivist lens, aided this study to assess how students at FUU build their understanding of the science of audiovisual production through practical exercises, peer interactions, and the application of theoretical concepts to real-world projects. The framework allows for an investigation into how instructors can facilitate this knowledge construction process effectively.

### ***Digital Generative Multimedia Tool Theory (DGMTT): Leveraging Technology for Enhanced Learning***

Given the inherently digital nature of modern audiovisual production, understanding how technology impacts learning is paramount. Digital Generative Multimedia Tool Theory (DGMTT) propounded by Onyejelem & Aondover (2024a) offers a contemporary framework for analysing the role of digital tools in multimedia learning. DGMTT posits that the generative capabilities of modern multimedia tools, allowing for interactive creation, manipulation, and simulation, significantly enhance cognitive engagement and knowledge retention (2024b). Specifically, DGMTT highlights how these tools facilitate active learning, experimentation, and the development of higher-order thinking skills. This research thus utilised DGMTT to examine how the use of digital tools in FUU's audiovisual production programmes influences students'

understanding of scientific principles. It helped in assessing whether these tools are being leveraged effectively to promote active learning and facilitate the construction of knowledge, and identify potential areas for improvement in their integration. The theory's focus on generative tools is particularly relevant given the increasing use of AI-powered software in the industry.

#### ***Technology Acceptance Model (TAM): Understanding Student Perceptions and Engagement***

The effectiveness of any pedagogical approach relies on students' willingness to engage with the learning process. Davis (1989) postulate that TAM provides a valuable framework for understanding how students perceive and adopt new technologies. TAM suggests that perceived usefulness and perceived ease of use are key determinants of technology acceptance (Aondover et al., 2025). In the context of this research, TAM was used to investigate how students' perceptions of the scientific principles underlying audiovisual production influence their engagement with related technologies and learning materials. If students perceive these principles as irrelevant or too difficult to grasp, they are less likely to invest the effort required to understand them. Thus, it is through the understanding of these perceptions, that this research can inform the development of strategies to enhance the perceived usefulness and ease of use of scientific concepts, thereby promoting greater student engagement and learning.

#### ***Synergistic Application of Constructivism, DGMTT, and TAM in Communicating the Science of Audiovisual Production***

These three frameworks are not mutually exclusive; rather, they are complementary. Constructivism provides the overarching theoretical foundation for understanding how learning occurs. DGMTT focuses specifically on the role of digital tools in facilitating this learning process, while TAM helps to explain the factors that influence students' willingness to engage with these tools and the underlying scientific concepts. Together, these frameworks provide a comprehensive framework through which to investigate the challenges and opportunities of communicating the science of audiovisual production at FUO.

#### ***Empirical Review***

Omoera et al (2023) studies, *The Making, Unmaking and Remaking of Contemporary Nigerian Theatre and Performance* and made a significant contribution to the ongoing discourse surrounding the evolution of Nigerian theatre and identified that established canon of Nigerian theatre history has largely overlooked significant contemporary voices. The study convincingly argue that the contributions of figures like Sunday Enesi Ododo (SEO), the study's central focus, have been unjustly marginalized within academic and critical circles. The collection directly challenges the perceived dominance of 20th-century playwrights such as Wole Soyinka and J.P. Clark-Bekederemo, advocating for a more inclusive and dynamic understanding of Nigerian theatre's trajectory as established by Clark (1979); Ogunbiyi, (2014). A particularly noteworthy aspect of the study is its engagement with SEO's concept of "Facekuerade" – a term he coined to describe the theatricality of Epira masquerade traditions that do not rely on physical masks (Ododo, 2004, 2007, 2008, 2009, 2010; Omoera, 2012).

The work effectively demonstrate how SEO's work has opened up new avenues for exploring the liminality and spiritual dimensions of African performance, influencing scholars globally to interrogate the presence of ancestral spirits in mask-less masquerade arts. This focus on indigenous epistemologies and performance practices is crucial for decolonizing African theatre studies and challenging Western-centric theoretical frameworks. Vitalis, et al (2023) investigated "Accessing Digital Divide and Implications in Nigeria: The Media Dimension," and provided a timely and relevant overview of the challenges surrounding equitable access to information and communication technologies (ICT) within the Nigerian context. Utilizing Diffusion of Innovation Theory, and its contribution to understanding the complex interplay between the digital divide, media consumption, and socio-economic development in Nigeria, the paper effectively established the significance of the digital divide as a critical issue impacting Nigeria's progress.

It accurately frames the divide not merely as a lack of access to technology, but as a multifaceted problem rooted in socio-economic factors, geographical disparities, and, crucially, digital literacy. The authors rightly highlighted the shift from traditional, one-way communication to a multi-dimensional digital ecology, where active participation is increasingly essential for full civic and economic engagement. Vitalis et al.'s (2023) study offers a valuable contribution to the understanding of the digital divide in Nigeria, particularly its implications for media access and participation. While the study suggests a need for more robust empirical evidence and a broader exploration of potential solutions, the authors effectively highlight the critical importance of addressing the digital divide to ensure equitable access to information, promote civic engagement, and foster socio-economic development in Nigeria.

Enekwe, et al. (2021) conducted a descriptive survey in Udi Education Zone, Nigeria, to identify challenges teachers face in employing audiovisual materials in social studies classes. Their findings indicated that inadequate funding, lack of sufficient materials, and insufficient training for teachers impede effective utilization. Despite these challenges, Enekwe et al. (2021) also explored feasible solutions, including increased funding, teacher supervision, improvisation, and student involvement. The research underscores a significant difference in the perception of challenges and solutions between male and female teachers, a finding which according to Enekwe et al. (2021), merits further exploration. The study's emphasis on providing adequate funds and supervision aligns with global best practices, emphasizing that resource availability and teacher training are crucial for the effective use of audiovisual materials. Accordingly, policymakers are encouraged to prioritize investment in multimedia resources and teacher capacity-building to enhance social studies education in secondary schools. Enekwe et al.'s (2021) empirical findings reinforce existing literature on the challenges and solutions associated with audiovisual materials in education and underscore the need for a multifaceted approach to improve their utilization in Nigerian schools.

Muhammad (2019) assessed “The Challenges of Archiving Audio Visual Heritages in Northern Nigeria, using observation method and found that in Northern Nigeria, the challenges of archiving audiovisual materials are compounded by infrastructural, policy, and technological constraints, threatening the accessibility and longevity of these invaluable resources. Muhammad’s (2019) study systematically identified the key impediments faced by government institutions, media houses, and other public agencies involved in audiovisual archiving in Northern Nigeria. The research underscored the deficiency of comprehensive national policies on preservation and conservation, which significantly hampers efforts to systematically archive and safeguard audiovisual heritage. The study also revealed that the absence of dedicated policies results in inconsistent management practices, leading to deterioration and misplacement of materials.

One of the primary challenges highlighted by Muhammad (2019) is the lack of trained personnel capable of managing archival collections. The study further observed that inadequate storage facilities and environmental control mechanisms constitute another significant problem, as poor storage conditions accelerate the deterioration of sensitive audiovisual materials. Muhammad (2019) however advocates for strategic initiatives, including the formulation of robust national policies, capacity-building programmes for archivists, technological upgrades, and the creation of awareness about the cultural significance of audiovisual heritage. The study provides crucial empirical evidence that addressing infrastructural, policy, and human resource challenges is essential for the sustainable management of audiovisual heritage in Northern Nigeria. It contributes to the scholarly understanding by highlighting specific contextual issues and proposing actionable strategies that could improve the preservation and accessibility of audiovisual collections for future generations.

#### ***Conceptual/Emprical Gaps and Research Focus***

While existing literature provides a valuable foundation for understanding the challenges of audiovisual production education, there is a gap in research specifically addressing the communication of scientific principles within the Nigerian context. This study aims to fill this gap by investigating the current practices at FUO, identifying the specific challenges faced by instructors and students, and proposing evidence-based strategies for curriculum enhancement. Using DGMTT, TAM, and constructivist learning theory, this study aims to offer a sophisticated understanding of how to explain the science of audiovisual production in a complex digital media environment.

## **METHODOLOGY**

### ***Research Design***

This study employed a mixed-methods research design, combining quantitative and qualitative data collection techniques to provide a comprehensive understanding of the research problem.

### ***Participants***

The study population comprised students from the Department of Journalism and Media Studies (JMS), Department of English and Communication Studies (ECS), and Department of Theatre & Film Studies (TFS) within the Faculty of Humanities at FUU. A stratified random sampling technique was used to select 200 students across the three departments. Additionally, ten lecturers with experience in audiovisual production were selected for Key Informant Interviews (KII).

### ***Data Collection Instruments***

- Survey Questionnaire: A structured questionnaire was administered to students to assess their perceptions of the current curriculum, their understanding of the scientific principles underlying audiovisual production, and the challenges they face in learning these concepts.
- Key Informant Interviews (KII): Semi-structured interviews were conducted with lecturers to gather their perspectives on the challenges of communicating the science of audiovisual production, the resources available, and potential strategies for improvement.

### ***Data Analysis***

Quantitative data from the survey was analysed using descriptive statistics (frequencies, percentages, means, standard deviations) and correlation analysis to identify relationships between variables. Qualitative data from the KIIs was transcribed and analysed using thematic analysis, a process of identifying recurring patterns and themes within the data (Braun & Clarke, 2006).

## **RESULT**

### ***Survey Findings***

The survey results revealed that a majority (65%) of students agreed that practical training was the primary focus of their audiovisual production courses. However, only 32% felt that the scientific principles underlying these techniques were adequately explained. A significant proportion (48%) expressed a desire for more in-depth instruction on topics such as acoustics, optics, and digital signal processing. Correlation analysis indicated a positive, albeit weak, correlation between students' self-reported understanding of scientific principles and their confidence in troubleshooting technical problems ( $r = 0.25$ ,  $p < 0.05$ ).

### ***Interview Findings***

Thematic analysis of the KIIs revealed several key themes:

- Resource Constraints: Lecturers consistently cited a lack of adequate laboratory equipment and software as a major obstacle to effectively teaching the science of audiovisual production.
- Curriculum Limitations: Several lecturers acknowledged that the curriculum lacked sufficient emphasis on the scientific foundations of audiovisual techniques.
- Large Class Sizes: Large class sizes were identified as a barrier to providing individualised attention and facilitating hands-on learning.
- Perceived Disconnect: Some lecturers expressed concern that students often viewed the scientific principles as abstract and irrelevant to their practical work.

### ***Data Presentation***

Here, the findings of the study are presented in line with the research objectives, their implications in relation to the existing literature are also discussed. The presentation integrated both quantitative data from the student survey and qualitative insights gleaned from the KIIs with lecturers.

### ***Assessing Current Methods of Communicating the Science of Audiovisual Production***

**Pedagogical Approaches:** The survey data revealed a dominant pedagogical approach centered on practical, hands-on training. 65% of students indicated that practical exercises constituted the primary mode of instruction in their audiovisual production courses. However, explicit instruction on the scientific principles underpinning these techniques was significantly less prevalent. KIIs corroborated this finding, with lecturers acknowledging a focus on “learning by doing” due to time constraints and perceived student preferences. One lecturer stated, “We try to sneak in the theory where we can, but the students are really here to learn how to use the equipment, not necessarily why it works.” This aligns with observations by Pate (2023) regarding the prioritization of skills-based training in Nigerian media education.

**Integration of Scientific Principles:** Only 32% of students reported feeling that the scientific foundations of audiovisual techniques were adequately explained within the curriculum. This low percentage highlights a significant gap in the current educational approach. Analysis of course syllabi from the JMS, ECS, and TFS departments confirmed a limited number of dedicated modules explicitly addressing acoustics, optics, or digital signal processing. Instead, these concepts were often integrated peripherally within broader production courses.

**Instructor Perceptions:** Lecturers expressed a mixed view on the balance between practical skills and scientific theory. While acknowledging the importance of scientific understanding, many felt constrained by curriculum demands and student preparedness. Several lecturers noted that students often lacked the necessary foundational knowledge in physics and mathematics to fully grasp the theoretical concepts. As one lecturer explained, “It’s difficult to explain the Fourier transform to students who haven’t had a solid grounding in calculus.”

**Resource Availability:** The study revealed significant resource constraints. KIIs consistently identified a lack of modern laboratory equipment, specialized software, and updated learning materials as major obstacles. Many departments relied on outdated equipment, limiting students’ ability to experiment with cutting-edge technologies and visualize scientific principles.

### ***Identifying Challenges in the Communication Process***

**Challenges Faced by Lecturers:** Resource limitations were the most frequently cited challenge by lecturers. Large class sizes (averaging 40-50 students per course) were also identified as a significant barrier to providing individualized attention and facilitating in-depth discussions. Lecturers also expressed concern about student motivation and a perceived lack of interest in the theoretical aspects of audiovisual production.

**Challenges Faced by Students:** Students reported several challenges, including a perceived lack of relevance of scientific concepts to practical applications, difficulty understanding complex theoretical material, and a lack of foundational knowledge in relevant scientific disciplines. 48% of students expressed a desire for more in-depth instruction on topics like acoustics and optics. Qualitative data from open-ended survey questions revealed that many students viewed these concepts as “too abstract” or “not directly applicable to their work.”

**Impact of Large Class Sizes:** Large class sizes were consistently identified as a hindrance to effective science communication. Lecturers reported difficulty providing individualized feedback, facilitating hands-on activities, and addressing students’ specific learning needs. Students also noted that large classes made it challenging to ask questions and participate in discussions.

**Technology Acceptance and Learning Styles:** While students generally exhibited positive attitudes towards technology, the study found a correlation ( $r = 0.25, p < 0.05$ ) between self-reported understanding of scientific principles and confidence in troubleshooting technical problems. This suggests that students who possessed a stronger scientific foundation were more likely to engage with and effectively utilize digital tools. This finding supports the principles of the Technology Acceptance Model (Davis, 1989), indicating that perceived usefulness (understanding why a tool works) influences technology acceptance and engagement.

### ***Strategies for Curriculum Enhancement***

Based on the findings, several strategies for enhancing the integration of scientific principles into the curriculum were identified:

- **Curriculum Revision:** The development of dedicated modules on acoustics, optics, and digital signal processing is crucial. These modules should be integrated into core audiovisual production courses, rather than offered as optional electives.
- **Hands-on Laboratory Exercises:** Increased investment in laboratory equipment and the development of hands-on exercises that allow students to apply theoretical concepts to real-world scenarios are essential.
- **Industry Collaboration:** Establishing partnerships with industry professionals can provide students with valuable insights into the practical applications of scientific principles and expose them to cutting-edge technologies.
- **Faculty Development:** Providing lecturers with opportunities for professional development in areas such as acoustics, optics, and digital signal processing will enhance their ability to effectively communicate these concepts to students.
- **Leveraging DGMTT:** Integrating Digital Generative Multimedia Tools (Onyejelem & Aondover, 2024a) such as interactive simulations and virtual reality environments – can facilitate student learning and engagement with complex scientific concepts.

## DISCUSSION

The findings of this study confirm the existence of a significant gap between the practical skills training and the scientific understanding of audiovisual production students at FUU. This gap is exacerbated by resource constraints, large class sizes, and a perceived disconnect between theoretical concepts and practical applications. The study's findings align with existing literature highlighting the challenges facing Nigerian media education (Omoera et al., 2017; Nkwam-Uwaoma & Onu, 2018; Pate, 2023) and underscore the need for a more holistic and integrated approach to audiovisual production education. In order to prepare future media professionals to thrive in a rapidly changing digital landscape and contribute to the development of a robust and technologically advanced media sector in Nigeria, it is imperative that these challenges be addressed. The study's recommendations; curriculum revision, increased investment in resources, faculty development, and the integration of DGMTT, represent a roadmap for improving the communication of the science of audiovisual production at FUU. Additional research is required to assess the efficacy of these strategies and investigate novel approaches to science communication in the context of Nigerian higher education.

## CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that while practical skills are valued in audiovisual production programmes at FUU, there is a significant gap in the communication of the underlying scientific principles. Addressing this gap is crucial for preparing future media professionals to thrive in a rapidly evolving digital landscape.

*Unique Contribution:* This study provides a localized perspective on the challenges of communicating audiovisual science within a Nigerian university context, contributing to a broader understanding of pedagogical approaches in developing countries.

### **Recommendations**

Based on the findings, the following recommendations were formulated:

- **Curriculum Revision:** The curriculum should be revised to explicitly incorporate scientific concepts into relevant courses. This could involve dedicated modules on acoustics, optics, and digital signal processing.
- **Investment in Equipment:** FUU should invest in updated audiovisual laboratory equipment and software to facilitate hands-on learning and experimentation.
- **Faculty Development:** Lecturers should be provided with opportunities for professional development to enhance their understanding of the science of audiovisual production and their ability to effectively communicate these concepts to students.
- **Establishment of a Faculty of Communication and Media Studies:** The establishment of a dedicated Faculty of Communication and Media Studies would allow for a more focused and comprehensive approach to media education, including the integration of scientific principles.

- Industry Collaboration: Strengthening collaborations with industry professionals through internships and guest lectures can provide students with real-world insights and expose them to the practical applications of scientific knowledge.

### **FURTHER STUDY**

Ethical consent was sought and obtained from the participants used in this study. They were made to understand that the exercise was purely for academic purposes, and their participation was voluntary.

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