International Journal of Education, Technology and Social Sciences

Volume 2 | Issue 4, October-December 2026, pp 1-10

ISSN (Online): 3139-1036

Homepage: https://ijetss.com



Title:	INSTITUTIONAL MANDATE AND SYSTEMATIC INTEGRATION OF INSTRUCTIONAL SYSTEM DESIGN (ISD) MODELS IN NIGERIAN UNIVERSITIES: A PATHWAY TO ENHANCED PEDAGOGICAL QUALITY AND TEACHING EFFICACY
Author(s):	Nasiru Muhammad Garba PhD
Affiliation(s):	Department of Curriculum Studies, Faculty of Education Shehu Shagari University of Education, Sokoto Nigeria
DOI:	https://doi.org/10.65919/ijetss.2026.v2i4001
History:	Received: 13 August 2026, Accepted: 25 September 2026, Published: 10 October 2026
Citation:	Garba, N. M. (2026). INSTITUTIONAL MANDATE AND SYSTEMATIC INTEGRATION OF INSTRUCTIONAL SYSTEM DESIGN (ISD) MODELS IN NIGERIAN UNIVERSITIES: A PATHWAY TO ENHANCED PEDAGOGICAL QUALITY AND TEACHING EFFICACY. *International Journal of Education, Technology and Social Sciences, 2*(4). 1-10, https://doi.org/10.65919/ijetss.2026.v2i4001
Copyright:	© 2026 The Author(s)
Licensing:	Open access under CC BY-NC 4.0
Conflict of Interest:	The author(s) declare no conflict of interest.
Funding:	This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
Corresponding Author:	Nasiru Muhammad Garba PhD ✉
Published By:	UnivColl Publications

INSTITUTIONAL MANDATE AND SYSTEMATIC INTEGRATION OF INSTRUCTIONAL SYSTEM DESIGN (ISD) MODELS IN NIGERIAN UNIVERSITIES: A PATHWAY TO ENHANCED PEDAGOGICAL QUALITY AND TEACHING EFFICACY

Nasiru Muhammad Garba PhD
Department of Curriculum Studies, Faculty of Education
Shehu Shagari University of Education, Sokoto Nigeria

ABSTRACT

Instructional system design models (ISD) otherwise known as instructional systems provide systematic and evidence-based approaches for enhancing the quality of teaching and learning in higher education (universities in particular). Despite the relevance, of these systems, the instructional systems in Nigerian higher education remains un-systematic, adhoc and largely dependent on individual educators' initiative. This paper discussed the relevance of three ISD models; ADDIE, ASSURE, and ARCS and argues for institutionally-driven integration within Nigerian universities. Drawing on literature and scholarly works, the paper highlights the potentials of the models to enhance instructional planning learner motivation and learning outcomes. In addition, the paper pointed out challenges such as lack of formal policies, inadequate professional development, and lecturers' competences and skills weak ICT infrastructure, and absence of instructional support units as obstacles to effective use of ISD models. The paper posits that institutionally driven framework for the use of ISD models is crucial for achieving standardized instructional quality. Based on the issues identified in the paper, it is recommended that Universities should establish teaching and innovation units, to promote ISD-based course design, embedding ISD in professional development programmes, strengthening ICT infrastructure, and incorporating ISD adoption into promotion and evaluation systems in the universities.

Keywords: Instructional System Design (ISD), ADDIE model, ASSURE model, ARCS model and Institutional integration.

INTRODUCTION

Higher Education Institutions (HEIs), particularly the universities serve as the pivotal engine for human capital development and the promotion of knowledge-based economy that supports with the 21st century paradigm. In the university system of education, like other educational systems the quality of teaching is continuously evaluated for effectiveness. A critical factor of instructional quality lies in how instruction is designed and delivered. For decades, the primary instructional approach across many Nigerian universities has been the traditional, teacher-centered lecture method (Okpara & Ezeador, 2024).

The global shift toward digital learning environments and competence-based education has intensified calls for pedagogical reforms that promote active learning, critical thinking, collaboration, and problem-solving. Yet, in Nigeria, the continued dependence on unsystematic and adhoc instructional practices limits the production of globally competitive graduates (Isa et al., 2020). This weakness is compounded by the absence of institutionally enforced instructional models, leaving teaching quality to depend largely on individual lecturers' personal initiative.

Instructional System Design (ISD) models such as ADDIE, ASSURE, and ARCS offer structured frameworks that systematically integrate learner analysis, instructional planning, media use, motivation, and evaluation into teaching practice (Molenda, 2022; Keller, 1987) . However, studies indicate that awareness and utilization of these models among Nigerian university lecturers remain uneven and largely superficial (Adegbija & Fakomogbon, 2020; Yusuf & Afolabi, 2010). This paper therefore advances the argument that sustainable improvement in

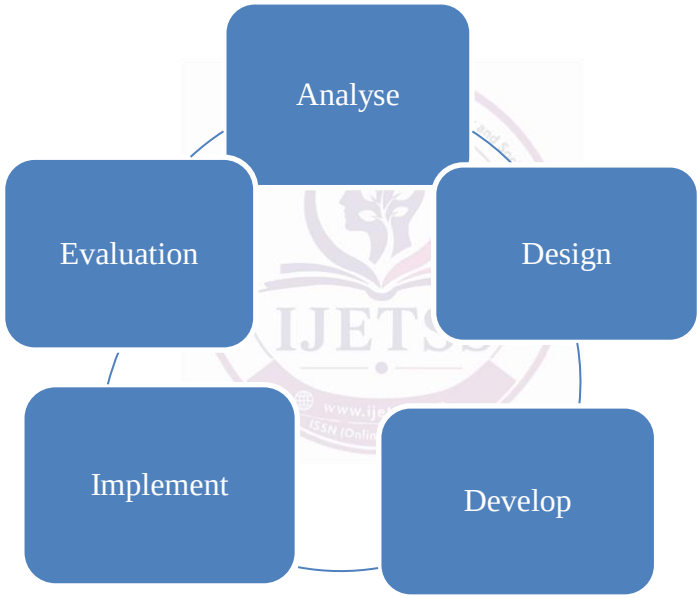
teaching quality in Nigerian universities requires the formal institutionalization of ISD models through policy mandates, professional development, and instructional quality assurance systems. This is because there is a lack of evidence showing the effective use of these models for instructional planning and development in higher education system.

Overview of ISD Models as Institutional Pedagogical Frameworks

ISD models provide structured processes for designing, implementing, and evaluating instruction. Among the most widely applied are ADDIE, ASSURE, and ARCS.

THE ADDIE MODEL

The ADDIE model stand for Analysis, Design, Development, Implementation, and Evaluation is arguably the most foundational ISD framework in education and training (Merrill, 2002). It provides a linear yet flexible structure that guides lecturers from initial needs assessment to continuous evaluation of instructional effectiveness. The ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) provides a systematic structure for instructional planning and continuous improvement (Molenda, 2022). When institutionalized, ADDIE promotes standardization in curriculum planning, coherence in course delivery, and reflective evaluation of learning outcomes.



Source: Researcher – designed, (2025)

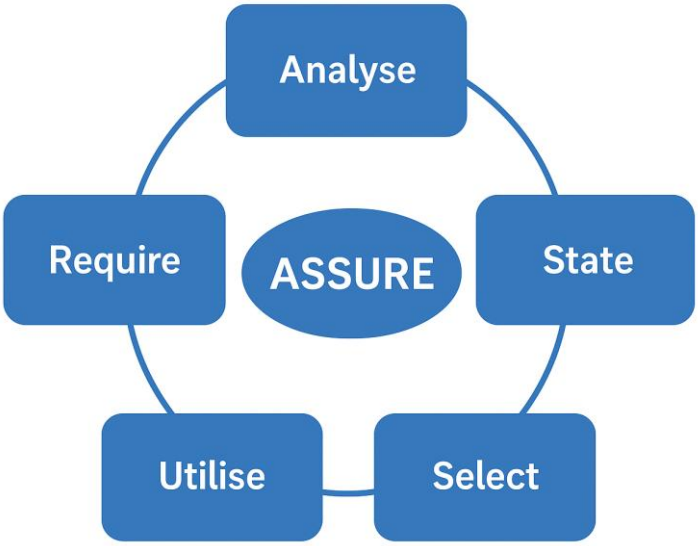
This diagram shows that the **ADDIE model is a systematic and iterative process** that helps educators and trainers design more effective instructional materials. Each stage feeds into the next, ensuring that instruction is well-planned, properly developed, effectively delivered, and continually improved.

RELEVANCE FOR INSTITUTIONAL INTEGRATION

At the institutional level, ADDIE can serve as a standardized guide for curriculum development, ensuring that all lecturers follow a systematic process when preparing courses. Shakeel et al. (2023) note that ADDIE improves learner engagement and outcomes when applied consistently. Institutionalizing this model promotes coherence across departments, enhances reflective teaching practices, and ensures that instructional materials are pedagogically sound.

The ASSURE model

The ASSURE model stand for Analyze Learners, State Objectives, Select Methods/Media/Materials, Utilize Media and Materials, Require Learner Participation, and Evaluate and Revise is an ISD framework spec ifically designed to integrate technology and media into teaching (Mohamad et al., 2016). Unlike ADDIE, ASSURE places strong emphasis on the role of multimedia resources and active learner participation. The ASSURE model emphasizes media and technology integration through learner analysis, objective formulation, media selection, learner participation, and evaluation (Mohamad et al., 2016; Shakuntla & Dinesh, 2020). Its institutional adoption is critical for supporting Nigeria's digital transformation agenda in higher education.



Source: Researcher – Designed (2025).

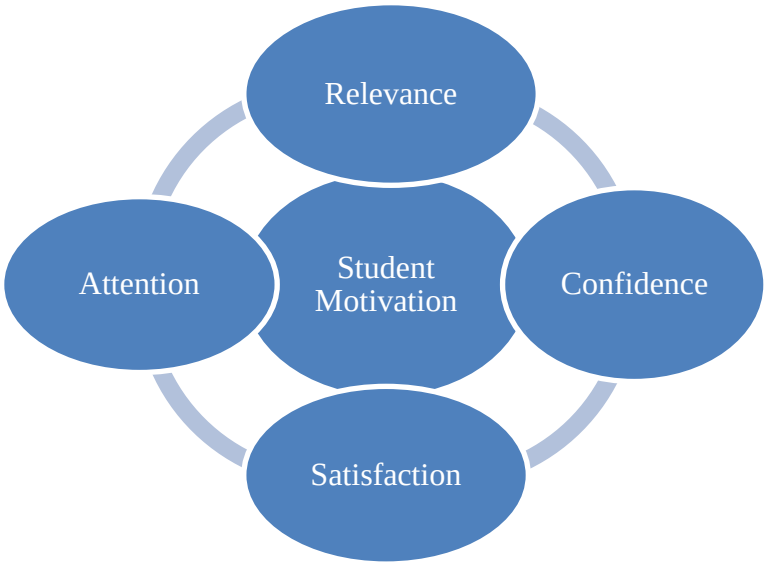
The diagram shows that the ASSURE Model is a practical and technology-friendly instructional design process. It helps teachers plan lessons that are learner-centered, objective-driven, interactive, and continuously improved. Each step links to the next, creating a systematic cycle for effective teaching.

RELEVANCE FOR INSTITUTIONAL INTEGRATION

ASSURE aligns directly with the global movement toward technology-enhanced learning. Its institutional adoption ensures that lecturers apply consistent digital pedagogy, promoting effective use of multimedia, learning management systems, and interactive tools. As Mohamad et al. (2016) observe, proper application of ASSURE improves technology integration and student engagement. Nigerian universities can use this model to standardize ICT-based teaching, especially where digital transformation is a priority.

THE ARCS MODEL

The ARCS model, developed by Keller (1987), focuses on four components essential for sustaining learner motivation: Attention, Relevance, Confidence, and Satisfaction. Unlike ADDIE and ASSURE, which emphasize instructional planning and media integration, ARCS addresses the affective and motivational dimensions of learning. The ARCS model focuses on learner motivation through Attention, Relevance, Confidence, and Satisfaction (Keller, 1987; Fang et al., 2024). It is integration at institutional level ensures that motivation becomes a core pedagogical requirement rather than an incidental outcome of instruction.



Source: Researcher – Designed, (2025).

The diagram shows that **Student Motivation** is strengthened when teachers deliberately design lessons that incorporate **Attention, Relevance, Confidence, and Satisfaction**. These four elements work together to improve learner engagement, persistence, and academic achievement.

RELEVANCE FOR INSTITUTIONAL INTEGRATION

Motivation is a critical yet often overlooked aspect of teaching quality. Institutionalizing ARCS would help universities ensure that lecturers consistently design instruction that motivates and retains learners, especially in large-class settings typical of Nigerian universities. Fang et al. (2024) affirm that ARCS-based instruction increases student engagement and persistence. Adoption at the institutional level can improve student outcomes and lecturers' perceived teaching efficacy.

JUSTIFICATION FOR ISD MODELS INTEGRATION IN INSTRUCTIONAL PLANNING AND DEVELOPMENT

Leaving the adoption of Instructional System Design (ISD) models to the discretion of individual lecturers often results in fragmented, inconsistent, and unsystematic teaching practices across departments and faculties (Adegbija & Fakomogbon, 2020; Ogunode et al., 2023). Such inconsistency weakens instructional quality, limits innovation, and creates disparities in student learning experiences. Institutionalizing ISD models provides a structured foundation for curriculum delivery and ensures that all lecturers follow a coherent, research-driven instructional process. The benefits of institutional integration include:

1. **Standardized Instructional Planning**

Institutionalizing ISD models creates a uniform framework that guides lecturers in analysing learners, designing lessons, developing instructional materials, and evaluating outcomes **(Ogunode et al., 2023)**. This prevents ad-hoc planning and ensures that instructional decisions are based on clear objectives and systematic processes. Standardization also supports seamless curriculum implementation across departments, promoting consistency in programme delivery, which is crucial for maintaining quality in higher education **(Adegbija & Fakomogbon, 2020)**.

2. **Systematic Technology Integration**

ISD models, particularly ADDIE and ASSURE, embed technology selection, utilization, and evaluation as core components of instructional planning. Institutional adoption ensures that lecturers integrate digital tools deliberately and effectively rather than using them randomly or based on personal comfort. This aligns

instructional practices with contemporary digital learning environments and national ICT-in-education reforms (Ogunode et al., 2023).

3. Improved Lecturer Teaching Efficacy

A system-wide ISD framework enhances lecturers' confidence and competence in instructional planning, material development, and technology-mediated teaching. When institutions provide training and policy support, lecturers develop stronger skills in aligning methods, materials, and assessments with learning objectives, thereby improving their overall teaching efficacy (Adegbija & Fakomogbon, 2020).

4. Enhanced Student Engagement and Learning Outcomes

ISD-driven instruction is learner-centered, ensuring that teaching strategies respond to students' characteristics, prior knowledge, learning styles, and motivational needs. This leads to more engaging classroom experiences and improved learning outcomes. Systematic design also ensures clearer learning paths, more interactive lessons, and assessments that better measure students' competencies (Mohammed, 2018).

5. Accountability in Instructional Delivery

Institutional governance of ISD models creates clear expectations for instructional quality. It enables departments to monitor lesson planning, material preparation, and assessment practices. This accountability mechanism helps ensure that teaching is purposeful and evidence-based, reducing variability in instructional standards across lecturers.

6. Alignment with National Digital Education Goals

Nigeria's education policies increasingly emphasize digital literacy, ICT integration, and innovation in teaching **(Federal Ministry of Education, 2021; NUC, 2019)**. Institutionalizing ISD models ensures that universities align with these national priorities by embedding structured technology use, digital pedagogy, and quality assurance mechanisms into teaching processes. This positions institutions to meet accreditation standards and contribute to national educational development goals **(Ogunode et al., 2023)**.

These benefits underscore the need for Nigerian universities to adopt ISD models not merely as optional strategies but as institutional frameworks embedded into policy, professional development, and teaching evaluation systems.

REVIEW OF RELATED LITERATURE

Previous studies highlight both the potential and the challenges of ISD model adoption. For instance, the ADDIE model remains the foundational instructional design framework, widely used across educational settings (Devlin Peck, 2024). The ASSURE model has been shown to facilitate media/technology integration in lesson design (Mohamad, Embi & Nordin, 2016; review) while the ARCS motivational model has been widely adopted to maintain learner engagement (Fang et al., 2024). Adeoye et al. (2024) provide a qualitative review which suggests that although many federal universities Lecturers are aware of ADDIE, their understanding of its phases and how to adapt it to 21st-century learning environments remains superficial.

Abuhassna's (2023) review states that although ID models are well documented, actual application in educational settings is weak and fragmented; process fidelity, documentation of design phases and evaluation are often missing. In a study by Shakeel et al. (2023) combining ADDIE and rapid prototyping in a blended-learning course, the authors found that the blended design improved learning outcomes and had higher acceptance among students indicating that when utilisation is purposeful, the impact can be measured. Another study, Appraisal of ADDIE instructional design teaching strategy on academic performance of geometric concepts among upper basic students in Sokoto State, Nigeria (Muhammad & Binji, n.d.) found that when the ADDIE strategy was applied (utilised) in mathematics instruction the performance improved significantly showing that utilisation can lead to measurable outcomes

However, the literature also points to gaps. Research often focuses on e-learning contexts or media integration, rather than systematic uptake of ISD models by lecturers in traditional university settings. Moreover, studies that link lecturers' awareness/utilisation of ISD models to teaching efficacy are rare. Many lecturers may apply

components of ISD intuitively, lacking full conceptual grounding (Oladeji & Sikiru, 2021). There is also evidence of barriers: limited training, infrastructure constraints, heavy workloads, and institutional inertia.

In the federal universities of North-West. Nigeria context, studies on awareness and utilisation of Instructional System Design (ISD) models' frameworks remain limited. For example, awareness might be moderate but utilisation superficial; the translation into improved teaching efficacy is seldom empirically interrogated. This suggests a need for deeper positioning: not just *whether* ISD models are used, but *how* they become part of the institutional culture and teaching practice.

CHALLENGES OF ISD MODEL IMPLEMENTATION IN NIGERIAN UNIVERSITIES

Despite the pedagogical value of Instructional System Design (ISD) models of ADDIE, ASSURE, and ARCS, their uptake in Nigerian universities remains limited and inconsistent. The issue is not primarily a lack of consciousness many lecturers know about ISD principles but rather a set of **systemic, structural, and institutional barriers** that impede effective utilization. These challenges require coordinated institutional interventions to ensure that ISD models move from optional, individual-level practices to sustainable, university-wide instructional standards.

1. **Absence of Formal Policies Mandating ISD-Based Course Design**

One of the most significant barriers is the lack of institutional policies that formally require lecturers to adopt ISD frameworks when developing course materials. In many Nigerian universities, instructional design is not embedded into **teaching guidelines, curriculum development procedures, or quality assurance frameworks**. This policy gap means lecturers are left to determine individually how to plan lessons, integrating ISD principles only if they choose to do so. Ogunode et al. (2023) argue that weak institutional governance in teaching and learning contributes directly to inconsistent instructional practices across departments. Without formal mandates, ISD models remain optional rather than foundational.

3. **Limited and Unsustained Professional Development**

Professional development on ISD models, where available, tends to be **sporadic, unsustained, and lacking follow-up support**. Workshops are often conducted as one-off events sometimes driven by external funding, accreditation exercises, or temporary initiatives without structured mentorship, evaluation, or monitoring mechanisms to ensure long-term application. Adeoye (2024) notes that lecturers frequently receive theoretical exposure to instructional design models but lack the sustained coaching needed to translate these principles into classroom practice. When universities do not institutionalize continuous professional learning, ISD concepts remain abstract and rarely evolve into habitual teaching strategies.

4. **Heavy Workload and Large Class Sizes**

Lecturers in Nigerian universities commonly face **overwhelming teaching loads**, often handling multiple courses, large student populations, and administrative responsibilities simultaneously. Such workload pressures discourage the adoption of ISD models, which require careful analysis, deliberate planning, and time-intensive evaluation. Large class sizes sometimes exceeding 300 students make learner-centered approaches promoted by ADDIE, ASSURE, and ARCS difficult to implement consistently. Reigeluth and An (2020) emphasize that instructional design thrives in environments that support reflective teaching; however, the reality in many Nigerian institutions is dominated by survival-driven teaching, where lecturers prioritize content coverage over structured design.

5. **Inadequate ICT Infrastructure and Technical Support**

Technology is a cornerstone of modern instructional design, particularly within the ASSURE model, which emphasizes media selection and technology integration. However, many Nigerian universities suffer from **poor ICT infrastructure**, including unreliable electricity, insufficient computer laboratories, limited internet bandwidth, outdated multimedia equipment, and a lack of trained technical personnel. Udebu et al. (2024) highlight that these infrastructural deficiencies create substantial barriers to the implementation of technology-

driven instructional methods. Without functional ICT systems, lecturers cannot effectively integrate digital tools into lessons, rendering ISD models incomplete or impractical.

6. **Lack of Instructional Design Support Units**

Globally, effective ISD adoption is strengthened by institutional structures such as **Teaching and Learning Centers, Instructional Design Units, or Learning Innovation Hubs**. Such units provide specialized support curriculum planning, multimedia development, peer coaching, and evaluation mechanisms. In contrast, most Nigerian universities lack these dedicated support centers. Abuhassna (2023) notes that the absence of instructional design specialists within institutions leaves lecturers without the technical and pedagogical assistance necessary for designing high-quality instructional materials. As a result, lecturers work in isolation, often reverting to traditional lecture methods due to limited support.

SYNTHESIS OF THE CHALLENGES

Taken collectively, these challenges reveal that the problem of ISD uptake is **systemic rather than individual**. While lecturer awareness is a necessary foundation, it is insufficient without institutional structures that reinforce and sustain the use of ISD models. The absence of policies, limited professional development, high workload pressures, poor ICT infrastructure, and lack of instructional support units create an environment in which ISD models cannot flourish. As Ogunode et al. (2023) emphasize, improving teaching quality in Nigerian universities requires system-level changes that address structural barriers, not just lecturer-level interventions.

POSITION STATEMENT

Instructional System Design models must transition from being optional teaching tools to becoming institutionally mandated pedagogical frameworks. In Nigerian universities. Without institutional enforcement through policy, training, evaluation, and infrastructural support, ISD adoption will remain fragmented, superficial, and unsustainable. Institutionalizing ISD models is therefore fundamental to achieving standardized teaching quality, strengthening lecturers' teaching efficacy, and ensuring consistent learning outcomes across disciplines.

REPOSITIONING ISD MODELS: A POLICY AND PRACTICE PERSPECTIVE

Repositioning ISD models within Nigerian universities education requires shifting from individual level to systemic adoption. The following strategies are proposed:

i. Universities should establish Teaching and Learning Innovation Units tasked with developing ISD-based guidelines, templates, and review mechanisms. Course approval processes should require evidence of ISD alignment similar to quality assurance standards applied in curriculum design (Ohiare, Ogunode & Sarafadeen, 2024).

ii. Professional development programs should embed ISD as a core pedagogical competency across disciplines. Refresher courses and mentoring should help lecturers apply ADDIE, ASSURE, and ARCS in technology-mediated learning environments (Edugist, 2024).

iii. Lecturers' adoption of ISD frameworks should form part of teaching performance evaluations, promotion criteria, and peer review portfolios. This ensures consistency between institutional expectations and instructional practice.

iv. Universities should align their ICT and educational technology units with ISD principles, enabling lecturers to leverage multimedia, simulations, and learner analytics in design and delivery (Igboeli et al., 2021).

v. When properly institutionalized, ISD models not only standardize teaching processes but also enhance lecturers' self-efficacy their belief in the ability to facilitate effective learning. Studies (Hannafin & Rieber, 1989; Merrill, 2002) affirm that structured design processes reduce uncertainty, improve instructional consistency, and strengthen reflective practice.

CONCLUSION

Although lecturers in Nigerian universities demonstrate growing awareness of ISD models, effective institutional utilization remains weak due to policy gaps, infrastructural deficits, limited training, and absence of instructional design support systems. For ISD models to exert meaningful impact on teaching efficacy and learning quality, Nigerian universities must move beyond individual adoption to formal institutional integration. When embedded within policy frameworks, professional development structures, and quality assurance systems, ISD models offer a sustainable pathway for transforming pedagogy and strengthening instructional excellence in Nigerian higher education.

SUGGESTIONS

1. Federal universities should develop explicit policies mandating the use of ISD frameworks in curriculum design, lesson planning, and teaching evaluation.
2. Continuous professional development workshops should be institutionalized, emphasizing hands-on application of ADDIE, ASSURE, and ARCS models across disciplines.
3. Establish Teaching and Learning Innovation Units responsible for mentoring lecturers, monitoring ISD-based instruction, and supporting technology integration.
4. Incorporate ISD application as a measurable criterion in academic promotion, teaching awards, and peer-review processes.
5. Strengthen ICT infrastructure and provide technical support to facilitate the practical integration of digital media as advocated by the ASSURE model.
6. Encourage cross-university research collaborations to document best practices and contextual adaptations of ISD models in Nigerian higher education.

Author's Declaration & Publication Consent:

The author(s) declare that the manuscript is original, accurate to the best of their knowledge, and does not knowingly infringe any copyright, privacy, or other third-party rights. All necessary permissions, ethical approvals, disclosures, and consents, where applicable, have been obtained. The author(s) accept responsibility for the content, data, interpretations, conclusions, authorship, and compliance with applicable research and publication ethics. Any conflicts of interest and funding sources have been appropriately disclosed. The author(s) authorize the Journal and Publisher to publish and disseminate the article under the Creative Commons AttributionNoncommercial 4.0 International License (CC BY-NC 4.0).

REFERENCES

Abuhassna, H. (2023). *Instructional design support systems and the improvement of teaching quality in higher education*. Journal of Educational Multimedia & Technology, 12(3), 44– 59.

Adegbija, M. V., & Fakomogbon, M. A. (2020). Lecturers' awareness and utilization of instructional design models in Nigerian universities. *African Journal of Educational Technology*, 8(1), 22–34.

Adeoye, B. F. (2024). Professional development challenges in higher education: Implications for instructional design practice. *Nigerian Journal of Teacher Education*, 19(2), 51–67.

Edugist. (2024). *Strengthening pedagogical competencies through instructional design training*. Edugist Publications.

Fang, Y., Li, H., & Ahmed, S. (2024). Effects of ARCS-based instruction on university students' motivation and persistence. *International Review of Education Research*, 5(1), 77–93.

Federal Ministry of Education. (2021). National Policy on Information and Communication Technology (ICT) in Education. Abuja: Federal Government of Nigeria.

Hannafin, M., & Rieber, L. (1989). Psychological foundations of instructional design. *Educational Technology Research and Development*, 37(2), 91–101.

Igboeli, J. O., Okechukwu, C. I., & Aliyu, U. (2021). Enhancing technology-supported learning through institutional ICT strategies in Nigerian universities. *Journal of Digital Education Studies*, 6(2), 33–47.

Isa, S. G., Mammam, M. A., Badar, Y., & Bala, T. (2020). The impact of teaching methods on academic performance of secondary school students in Nigeria. International Journal of Development Research, 10(6), 37382-37385.

Keller, J. M. (1987). Development and use of the ARCS model of motivational design. *Journal of Instructional Development*, 10(3), 2–10.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development*, 50(3), 43–59.

Mohammed, A. (2018). Learner-centered approaches and their impact on student engagement in Nigerian tertiary institutions. Journal of Educational Foundations, 7(1), 112–124.

Mohamad, S., Ahmad, Z., & Hassan, R. (2016). The ASSURE model and technology integration in higher education classrooms. *Journal of Instructional Pedagogies*, 7(4), 12–23.

Molenda, M. (2022). The ADDIE model: A metaphor for performance improvement. *Performance Improvement*, 61(8), 20–27.

National Universities Commission (NUC). (2019). Benchmark Minimum Academic Standards (BMAS) for Nigerian Universities. Abuja: NUC.

Okpara, G. C., & Ezeador, C. N. (2024). Philosophy of teaching: Exploring various teaching methods for improved education in Nigeria. Nnadiebube Journal of Philosophy, 7(3).

Ogunode, N. J., Musa, U., & Idoko, I. (2023). Challenges affecting quality teaching in Nigerian universities: Implications for instructional design. *International Journal of Higher Education Policy*, 4(1), 56–68.

Ohiare, O., Ogunode, N. J., & Sarafadeen, A. (2024). Quality assurance and instructional design alignment in Nigerian universities. *West African Journal of Educational Management*, 10(2), 28–41.

Reigeluth, C. M., & An, Y. (2020). *Instructional-design theories and models: Building a common knowledge base*. Routledge.

Shakeel, M., Hameed, S., & Rahman, A. (2023). Evaluating learner outcomes using the ADDIE model in higher education. *Journal of Educational Inquiry*, 14(2), 59–74.

Shakuntla, & Dinesh, K. (2020). Application of ASSURE model for technology-enhanced teaching. *International Journal of Innovative Teaching Strategies*, 9(1), 100–108.

Udebu, C. C., Eze, J. U., & Bello, T. (2024). Barriers to ICT-driven teaching and learning in Nigerian universities. *Journal of ICT in Education and Development*, 3(2), 41–55.

Yusuf, M. O., & Afolabi, A. O. (2010). Effects of computer-assisted instruction on secondary school students' performance in biology. *The Turkish Online Journal of Educational Technology*, 9(1), 62–69.

Publisher's Note: The statements, opinions, findings, interpretations, and conclusions expressed in this article are solely those of the author(s) and do not necessarily reflect the views of the Journal, its Editors, Editorial Board, reviewers, or Publisher. Responsibility for the accuracy, integrity, and scholarly content of the article rests primarily with the author(s). The Journal, Editors, and Publisher exercise reasonable editorial and ethical oversight in accordance with the Journal's established policies. However, to the extent permitted by applicable law, they shall not be responsible for any consequences arising from the use, application, or interpretation of the information contained in the article. The Publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.