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BENEFITS OF CHATGPT AND SMART BOARD TOOLS ON UNDERGRADUATE PHYSICS STUDENTS' ACHIEVEMENT AND INTEREST IN IMO STATE.

By

[1.] Ibeku Ikenna Valentine
Department of Physics, Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria
Email: kingvalonline@yahoo.com

[2.] Professor Alphonsus O Ovute.
Department of Science Education, Michael Okpara University of Agriculture, Umudike, Umuahia, Abia State.
Email: ovutealphonsus@gmail.com

[3.] Professor Patience C. Agommuoh
Department of Science Education, Michael Okpara University of Agriculture, Umudike, Umuahia, Abia State.

Abstract

The integration of Artificial Intelligence (AI) and smart board technologies in education is no longer a luxury but a necessity, particularly in the dynamic and concept-intensive field of physics. These technologies are revolutionizing teaching and learning processes by enhancing interactivity, personalizing instruction, and fostering deeper engagement. This paper explores the influence of AI-driven platforms and smart board tools on undergraduate physics students' achievement and interest. Grounded in current educational theories and empirical insights, the discussion draws on conceptual reasoning and supportive literature to establish how digital tools affect cognitive and affective outcomes. The opinion supports the need for a strategic integration of AI and smart board technologies into university curricula, teacher training, and institutional frameworks. Ultimately, the paper advocates for a reimagined learning environment where physics education is not only accessible but also adaptive and inspiring to the 21st-century learner.

Keywords: Artificial Intelligence, Smart board tools, Physics education, Students' achievement, Interest

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INTRODUCTION

The 21st century has ushered in an era defined by rapid technological advancements that are reshaping every facet of human life, particularly education. In this context, the integration of Artificial Intelligence (AI) and smart board tools into pedagogical practices is becoming increasingly indispensable. AI refers to computer systems designed to perform tasks that typically require human intelligence, such as problem-solving, speech recognition, and adaptive learning. Examples include intelligent tutoring systems, chatbots, ChatGPT and recommendation algorithms that personalize learning experiences. These technologies are not only transforming how content is delivered and assessed but are also redefining the learner's role in the educational process. As Kay, LeSage, and Knaack (2019) note, "Interactive technologies like smart boards have the potential to significantly improve student engagement, understanding, and motivation." For a subject like physics often regarded as abstract and challenging, these tools offer innovative strategies for conceptual visualization, simulation, and experimentation that make learning more accessible and engaging. Smartboard features such as interactive writing surfaces, multimedia integration, drag-and-drop activities, and real-time quizzes provide concrete examples of how technology can support active learning in physics classrooms.

In many Nigerian universities, the teaching of physics is still largely traditional, relying heavily on chalk-and-board methods and rote memorization. This has contributed to low achievement levels and declining interest among students. According to Adesoji (2018), "Students' poor performance in physics is largely attributable to uninspiring teaching methods and lack of relevant instructional materials." The strategic use of AI tools, which provide personalized learning pathways, adaptive feedback, and predictive analytics, can help counter these issues by aligning instruction with individual student needs. Smart boards further enhance this approach by enabling dynamic presentations, collaborative problem-solving, and real-time annotations that bring physics concepts to life. This study argues that the combined use of AI and smartboard tools provides a substantial pedagogical advantage, moving beyond traditional methods by fostering deeper engagement, individualized instruction, and collaborative exploration of scientific concepts.

The COVID-19 pandemic intensified the need for resilient, technology-driven learning systems. Educational institutions worldwide were compelled to shift toward remote learning, highlighting the critical role of AI-enabled platforms and interactive tools in maintaining instructional continuity. As Holmes, Bialik, and Fadel (2019) assert, "AI offers the potential for highly responsive, personalized learning experiences that can improve outcomes for all students, especially those who struggle in traditional classrooms." With smart boards acting as collaborative hubs and AI functioning as an intelligent tutor, students are positioned to take more active roles in constructing knowledge, rather than passively receiving information.

Furthermore, there is a growing recognition that 21st-century skills such as critical thinking, digital literacy, and problem-solving must be embedded within science education. Physics, being a central pillar in Science, Technology, Engineering, and Mathematics (STEM), should lead this transformation. The deployment of AI and smart board tools in physics classrooms aligns with the global push for education that is not only content-rich but also technologically empowered. As noted by UNESCO (2021), "The integration of advanced technologies into teaching practices is essential for equipping learners with the skills required in a rapidly changing world."

The integration of AI and smart board tools represents a strategic response to the pedagogical, motivational, and infrastructural challenges plaguing physics education in Nigeria. By harnessing these technologies, institutions can move toward a more inclusive, responsive, and future-ready learning environment that nurtures both academic excellence and a sustained interest in scientific inquiry.

Objectives of the Study

This conceptual paper is aimed at:

1. Examining the educational benefits of Artificial Intelligence and smart board technologies.
2. Exploring their potential influence on undergraduate physics students' academic achievement.
3. Investigating how these technologies enhance students' interest in physics.
4. Recommending ways these technologies can be meaningfully adopted in Nigerian universities.

Review of Related Literature

The integration of technology in education has long been associated with improved teaching and learning outcomes (Mayer, 2017). AI is revolutionizing pedagogy through machine learning algorithms, predictive analytics, and intelligent feedback systems (Luckin et al., 2016). Studies by Holmes et al. (2019) assert that AI-powered learning environments foster personalized instruction by adapting to learners' styles and paces. Furthermore, virtual laboratories and simulations enable students to visualize and manipulate complex physical concepts, thereby enhancing conceptual understanding (Ajayi & Oloyede, 2021).

Smart boards, on the other hand, support multimodal teaching through audio-visual tools, interactive models, and collaborative learning activities. Research by Iwegbuna and Okoye (2020) observed that students taught using smart boards exhibited higher retention and participation rates. A study by Yusuf et al. (2018) demonstrated that smart boards significantly improved physics students' achievement and attitudes in senior secondary schools. These tools encourage peer learning, creativity, and immediate formative assessments, aligning with constructivist learning paradigms.

Despite these merits, challenges persist such as the high cost of acquisition, inadequate training of lecturers, and infrastructural limitations. Nonetheless, the long-term benefits of AI and smart board adoption far outweigh the transitional challenges, especially in fostering inclusive and innovative physics education.

Discussion- benefit of ai and smartboard

Artificial Intelligence is not merely an academic buzzword but a catalyst for rethinking pedagogical strategies. AI-powered educational systems like intelligent tutoring platforms, chatbots, and content recommendation engines offer customized feedback that traditional methods cannot match. In physics, where students often struggle with problem-solving and abstract reasoning, such support systems enable real-time remediation and cognitive scaffolding.

Smart board tools enhance interactivity through tactile engagement, audio-visual simulations, and collaborative exercises. When used effectively, they transform the classroom into an active learning hub where students construct knowledge rather than passively receive it. For instance, a physics lecturer demonstrating Newtonian mechanics through animated simulations on a smart board can evoke greater comprehension than a chalk-and-talk explanation.

From an instructional perspective, these technologies empower teachers to diversify lesson delivery, access a wealth of digital content, and monitor student progress dynamically. The integration of AI can also address language barriers, accommodate learners with disabilities, and support differentiated instruction.

Furthermore, both AI and smart boards contribute to sustained student interest. As observed in gamified platforms and simulation-based tasks, learners tend to invest more time and effort in environments that are immersive and responsive. Interest, which is a precursor to achievement, is significantly enhanced when learners find physics relatable, exciting, and engaging.

Conclusion

Artificial Intelligence and smart board technologies are not mere educational supplements but transformative tools capable of redefining how physics is taught and learned. They foster higher achievement by personalizing instruction, improving feedback mechanisms, and encouraging active learning. Likewise, they enhance interest by making physics interactive, visual, and learner-centered. The current reality in many Nigerian universities necessitates the urgent and deliberate integration of these tools, supported by training, infrastructure, and policy reforms.

Recommendations

1. Capacity Building for Educators:

Universities should prioritize continuous professional development by organizing workshops, training sessions, and seminars to equip physics educators with the knowledge and skills necessary to effectively use AI and smart board tools in instructional delivery. Training should also include pedagogical strategies, ethical implications of AI, and hands-on simulations to ensure effective classroom integration.

2. Curriculum Integration:

Educational policymakers and curriculum developers should work together to incorporate AI and smart technologies into the undergraduate physics curriculum. This will ensure that the use of these tools is not peripheral but central to lesson planning, delivery, assessment, and evaluation.

3. Investment in Educational Technology Infrastructure:

Government and institutional authorities should allocate sufficient funding for the procurement, installation, and maintenance of smart boards and AI learning platforms. Adequate power supply, stable internet connectivity, and technical support must also be ensured to maintain smooth usage.

4. Collaborations and Partnerships:

Universities should seek partnerships with educational technology companies, NGOs, and international development agencies to access advanced AI tools and training resources. These collaborations can provide customized content and scalable solutions tailored to the local academic context.

5. Monitoring and Evaluation Frameworks:

Institutions should develop mechanisms to monitor and evaluate the effectiveness of AI and smart board tools in improving student learning outcomes. Feedback from such evaluations should inform future adoption, training, and policy decisions.

6. Equity and Inclusion Measures:

It is crucial to ensure that technology-enhanced learning is inclusive. Special attention must be given to under-resourced institutions and rural areas. Subsidies, community-based tech centers, and shared access models can bridge the digital divide.

7. Research and Innovation Funding:

Government agencies, university research councils, and private stakeholders should provide grants for studies exploring the impact of AI and smart boards in science education. Such research will contribute to evidence-based policy and innovation in teaching practices.

8. Public Awareness Campaigns:

Awareness initiatives highlighting the benefits of AI and smart board technologies should be promoted among educators, students, and parents. Public engagement campaigns will help demystify these tools and encourage grassroots support for their adoption.

9. Policy Formulation and Regulatory Support:

Education ministries and accreditation bodies should formulate national policies and standards to guide the ethical, pedagogical, and infrastructural aspects of AI and smart board integration in Nigerian universities.

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