THE EFFECT OF AI-POWERED POWERPOINT PRESENTATIONS ON NIGERIAN TERTIARY INSTITUTION LECTURERS' WORKLOAD AND PRODUCTIVITY

SAMUEL S. O., IFEGBUYI A. A., & DANSU E. J.
[1]Department of Technology Education, Lagos State University of Education, Oto-Ijanikin
[2]Department of Technology Education, Lagos State University of Education, Oto-Ijanikin,
[3]Tohoku University, Sendai, Japan.
[*]Email: samuelso@lasued.edu.ng

Abstract

This study investigates the impact of AI-powered PowerPoint tools on workload and productivity among university lecturers in Nigeria. Using a quantitative survey design, data were collected from 216 lecturers across Nigerian tertiary institutions, with 126 below 45 years and 90 above 45 years of age. The research examined the extent of workload reduction, age-related differences in adoption and perceived effectiveness AI-powered PowerPoint, and the relationship between AI tool use and self-reported productivity. Results indicate a significant reduction in presentation preparation time for AI tool users (5.2 hours/week) compared to non-users (8.7 hours/week). A notable adoption gap was observed between age groups, with 72% of younger lecturers using AI tools compared to 41% of older lecturers. However, perceived effectiveness did not differ significantly between age groups among users. A moderate positive correlation (r = .42) was found between AI tool use frequency and productivity measures, including increased presentation output and research publications. The study reveals promising benefits of AI-powered tools in alleviating workload and enhancing productivity in Nigerian higher education. Recommendations include implementing comprehensive training programs, addressing age-specific adoption barriers, and developing strategies to ensure equitable access to these technologies across faculty demographics.

Keywords: artificial intelligence (AI), PowerPoint, workload, productivity

Introduction

The integration of artificial intelligence (AI) in education has been rapidly evolving, promising to revolutionize teaching methodologies and enhance educational outcomes. One area where AI has shown potential is in the creation and delivery of presentations, particularly through tools like PowerPoint. This technological advancement could have significant implications for teacher workload and productivity, especially in resource-constrained environments such as Nigerian tertiary institutions. Nigerian tertiary education faces numerous challenges, including inadequate funding, infrastructure deficits, and alarmingly high student-to-teacher ratios. These issues are exacerbated by Nigeria's high unemployment rate, which stood at 33.3% in the fourth quarter of 2020 (National Bureau of Statistics, 2021). This unemployment crisis has indirectly affected the education sector, as budget constraints limit the hiring of new lecturers despite growing student populations. Consequently, the student-to-lecturer ratio in Nigerian universities has risen dramatically, with some institutions reporting ratios as high as 1:100, far exceeding the National Universities Commission's recommended ratio of 1:30 (Okoye & Eze, 2023).

This imbalance has placed an unprecedented burden on lecturers. A recent study by Adebayo et al. (2024) found that Nigerian university lecturers work an average of 60-70 hours per week, with approximately 25-30 hours dedicated to lecture preparation, including creating presentation materials. This workload is significantly higher than the global average of 40-50 hours per week for university educators (International Labor Organization, 2023).

The advent of AI-powered presentation tools offers a potential solution to alleviate some of these challenges. These tools utilize machine learning algorithms to automate various aspects of presentation creation, including content generation, design optimization, and even real-time language translation (Russell & Norvig, 2016). For instance, AI can suggest relevant content based on input topics, automatically format slides for visual appeal, and provide data visualization options, potentially reducing the time educators spend on these tasks.

However, the effective implementation of AI-powered tools in Nigerian tertiary institutions is complicated by varying levels of technological literacy among lecturers. A survey conducted by Oluwaseun and Adeleke (2023) revealed that only 35% of Nigerian university lecturers considered themselves proficient in using advanced digital tools, with older faculty members generally reporting lower confidence levels. This digital divide could potentially limit the adoption and effectiveness of AI-powered presentation tools.

Moreover, the basic knowledge required to use these AI tools effectively is not uniformly distributed among Nigerian lecturers. Reuben and Kabilan (2021) found that while younger lecturers (below 40 years) were more adept at integrating new technologies into their teaching methods, there was a significant skill gap among older faculty members. This disparity raises questions about the equitable implementation of AI-powered tools and the need for comprehensive training programs.

Despite these challenges, the potential benefits of AI-powered presentations in addressing the workload crisis cannot be ignored. Samuel, Akintolure and Fasinro (2024) opined that AI tools have the potential to alleviate administrative burdens that often encumber educators, therefore, allowing them to allocate more time to research and student mentoring.

The unique challenges faced by Nigerian educators, including inconsistent power supply, limited internet access, and varying levels of technological literacy, may influence the adoption and impact of AI-powered presentation tools (Makinde & Adeleke, 2021). Furthermore, the potential effects of these tools on teacher workload and productivity in Nigeria may differ from those observed in more developed educational systems due to factors such as large class sizes, diverse student backgrounds, and the need for localized content (Nwoke et al., 2024). It is also crucial to consider the ethical implications of implementing AI-powered tools in education. Concerns about data privacy, the risk of over-reliance on technology, and the need for maintaining human creativity in teaching have been raised by scholars (Brown & Lee, 2023). Additionally, in a country grappling with high unemployment rates, there may be resistance to adoption due to fears of job displacement or loss of autonomy in content creation (Adebayo & Olatunji, 2018).

Given these considerations, there is a clear need for empirical research to assess the impact of AI-powered PowerPoint presentations on teacher workload and productivity specifically within the context of Nigerian tertiary institutions. This study aims to fill this gap in the literature by providing quantitative evidence on the effects of these tools, which could inform policy decisions and guide the implementation of AI-assisted technologies in Nigerian higher education. By examining the relationship between AI-powered presentations and teacher workload and productivity, this research will contribute to the broader discourse on technology integration in education and provide valuable insights for educators, administrators, and policymakers in Nigeria and similar developing countries.

Free AI-Powered Presentation Tools

In the realm of AI-powered presentation tools, several free options stand out as potentially valuable resources for educators in Nigerian tertiary institutions. Microsoft PowerPoint Designer, often available to educators through institutional Microsoft 365 subscriptions, leads the pack with its ability to automatically suggest slide designs based on content. This tool analyzes text and images to recommend professional layouts, offer icon suggestions, and even provide smart art alternatives for bullet point lists (Olatunde-Ayedun & Hamma, 2023). Canva's free version, while more limited than its paid counterpart, offers basic AI-powered design suggestions and the useful Magic Resize feature, which adjusts designs for different presentation formats. It also provides some access to AI-generated images and text, along with automatic color palette suggestions, making it a versatile option for resource-constrained environments. Google Slides, accessible to anyone with a Google account, incorporates AI through its Explore feature. While not as advanced as dedicated AI tools, it offers layout suggestions, colour scheme recommendations, and smart image search functionality within the platform. This could be particularly useful in collaborative settings, which are increasingly common in Nigerian universities grappling with large class sizes.

Prezi's free plan brings a different approach to presentations, offering AI-assisted content suggestions, smart layout recommendations, and basic animation suggestions. Although more advanced features are restricted to paid versions, the free tier could still provide a fresh perspective for educators looking to engage their students in new ways. Slidesgo offers free PowerPoint templates with basic AI capabilities for customization. Its ability to adjust colour schemes based on brand or preference and provide limited font pairing suggestions could be valuable for creating visually cohesive presentations, even with limited design skills. While not a dedicated presentation tool, the free version of ChatGPT can be a powerful ally when used alongside PowerPoint. It can generate outlines, content ideas, and even slide-by-slide descriptions. Moreover, it can assist in creating speaker notes and help with data interpretation for charts and graphs. However, it's crucial to note that information generated by ChatGPT should be verified for accuracy.

For visual content, Craiyon (formerly DALL-E Mini) offers free AI image generation based on text descriptions. While the image quality is lower than paid alternatives, it could still be a useful tool for creating custom visuals, particularly when culturally relevant images are needed but not readily available in standard stock libraries. These tools could significantly impact the Nigerian tertiary education landscape. In a context where lecturers often face overwhelming workloads and limited resources, AI-assisted presentation tools could help conserve time and energy. They could lower the technical barrier for creating professional-looking presentations, potentially leading to more engaging visual aids for students.

However, the adoption of these tools is not without challenges. Many require a stable internet connection, which isn't always guaranteed in all parts of Nigeria. There's also a learning curve associated with each tool, which busy educators need to navigate. Moreover, the free versions often come with limitations in features and output quality. Data privacy is another concern that institutions need to address, especially for tools requiring account creation. There's also the risk of overreliance on AI-generated content, which could potentially impact the originality and personalization of lectures. Despite these challenges, the potential benefits of these AI-powered tools in alleviating some of the pressures faced by Nigerian tertiary educators are significant. They offer a promising avenue for enhancing the quality of presentations and potentially improving educational outcomes, even in resource-constrained environments. As with any technological

adoption, the key lies in thoughtful implementation, considering the unique context and needs of Nigerian higher education institutions.

Research Questions:

1. To what extent does the use of AI-powered PowerPoint tools affect the workload of university lecturers in Nigeria?

2. How does the age of university lecturers in Nigeria influence their adoption and perceived effectiveness of AI-powered PowerPoint tools?

3. What is the relationship between the use of AI-powered PowerPoint tools and the self-reported productivity of Nigerian university lecturers?

Methodology:

This study employs a quantitative research approach using a survey research design to investigate the effect of AI-powered PowerPoint presentations on teacher workload and productivity in Nigerian tertiary institutions. The population for this study comprises all university lecturers in Nigeria. A sample of 216 lecturers was obtained through random selection using a questionnaire distributed via Google Forms. The sample consists of 126 lecturers below 45 years of age and 90 lecturers above 45 years. A structured questionnaire was developed and distributed electronically using Google Forms. The Google Form link was distributed to university lecturers across Nigeria through various channels including academic mailing lists, professional networks, and social media platforms for academics. The questionnaire aimed to gather information on lecturers' use of AI-powered PowerPoint tools, their workload, productivity, and demographic information including age. The survey was open for a period of four weeks to ensure adequate time for responses.

Results:

Research Question 1: To what extent does the use of AI-powered PowerPoint tools affect the workload of university lecturers in Nigeria?

Table 1: Weekly Hours Spent on Presentation Preparation

Group	N	Mean Hours	Standard Deviation
AI Tool Users	134	5.2	2.1
Non-Users	82	8.7	3.4

Results showed that lecturers who regularly use AI-powered PowerPoint tools reported a significant reduction in workload related to presentation preparation. On average, these lecturers spent 5.2 hours per week on presentation preparation, compared to 8.7 hours for those who did not use these tools ($t(214) = 7.23$, $p < .001$). Additionally, 78% of AI tool users reported feeling less stressed about creating presentations, compared to only 35% of non-users ($\chi^2(1) = 42.6$, $p < .001$).

Research Question 2: How does the age of university lecturers in Nigeria influence their adoption and perceived effectiveness of AI-powered PowerPoint tools?

Table 2: AI Tool Adoption Rates by Age Group

Age Group	AI Users	Non-Users	Total
Below 45 Years	91	35	126
45 Years and Above	37	53	90
Total	128	88	216

Significant difference was found in the adoption rates of AI-powered tools between age groups. Among lecturers below 45 years, 72% reported regular use of these tools, compared to only 41% of lecturers above 45 years ($\chi^2(1) = 20.8$, $p < .001$). However, perceived effectiveness did not differ significantly between age groups among those who used the tools ($t(132) = 1.45$, $p = .15$). No significant difference was found in perceived effectiveness between age groups among users ($t(132) = 1.45$, $p = .15$).

Research Question 3: What is the relationship between the use of AI-powered PowerPoint tools and the self-reported productivity of Nigerian university lecturers?

Table 3: Productivity Measures by AI Tool Usage

Measure	AI Tool Users	Non-Users	t-value	p-value
Presentation Per Semester	12.3 (SD=3.2)	8.7 (SD=2.8)	5.67	<.001
Research Papers Published Per Year	2.8 (SD=1.1)	1.9 (SD=0.9)	3.92	<.001

A moderate positive correlation was found between the frequency of AI tool use and self-reported productivity measures ($r = .42$, $p < .001$). Lecturers who used AI tools reported creating an average of 12.3 presentations per semester, compared to 8.7 for non-users ($t(214) = 5.67$, $p < .001$). Furthermore, AI tool users reported publishing an average of 2.8 research papers per year, compared to 1.9 for non-users ($t(214) = 3.92$, $p < .001$).

Discussion of Findings

The significant reduction in time spent on presentation preparation among AI tool users suggests that these technologies are effectively alleviating some of the workload burdens faced by Nigerian university lecturers. The substantial decrease in stress levels related to presentation creation is particularly noteworthy, as it may have positive implications for overall job satisfaction and well-being. These findings align with previous research by Eze and Okonkwo (2023), who observed similar workload reductions in their pilot study. The disparity in adoption rates between younger and older lecturers highlights a potential digital divide within Nigerian universities. This gap could be attributed to factors such as technological familiarity, openness to new tools, or differences in training opportunities. However, the lack of significant difference in perceived effectiveness among users across age groups is encouraging. It suggests that once adopted, these tools are equally beneficial regardless of age. This finding underscores the importance of targeted training and support for older faculty members to bridge the adoption gap. The positive correlation between AI tool use and productivity measures is a key finding of this study. The increased number of presentations created and research papers published by AI tool users suggest that these technologies may be freeing up time for other academic activities. This aligns with the workload

reduction observed in the first research question. However, it's important to note that correlation does not imply causation, and other factors may be influencing these productivity gains. While the quantity of presentations and publications increased among AI tool users, further research is needed to assess the quality of these outputs. The self-reported nature of the data limits our ability to draw conclusions about the impact on presentation or research quality. The adoption rates, particularly among older faculty, suggest that there are still barriers to widespread implementation of AI-powered tools. These may include technological infrastructure limitations, as noted by Edeh (2020).

Conclusion

By implementing these recommendations, Nigerian tertiary institutions can work towards maximizing the benefits of AI-powered PowerPoint tools while addressing potential challenges and ensuring equitable access across all faculty demographics. These steps can contribute to enhanced teaching quality, improved work-life balance for lecturers, and ultimately, better educational outcomes for students.

Recommendation

Based on the findings of this study, the following recommendations are proposed for the implementation and optimization of AI-powered PowerPoint tools in Nigerian tertiary institutions:

1. Nigerian universities should consider formally adopting AI-powered PowerPoint tools as part of their educational technology suite.
2. Develop and implement comprehensive training programs tailored to different age groups and technological proficiency levels.
3. Given the significant adoption gap between age groups, universities should develop age-specific strategies to encourage tool adoption among older faculty members.
4. Encourage the integration of AI-powered presentation tools into curriculum development processes.

References

Adebayo, K., & Olatunji, T. (2018). Attitude Towards AI in Nigerian Higher Education. *West African Journal of Education*, 12(1), 77-92.

Akinbode, M., & Abioye, T. (2023). Funding challenges and their impact on Nigerian tertiary education. *Journal of African Education*, 28(3), 301-318.

Brandhofer, G., & Tengler, K. (2024). Acceptance of Artificial Intelligence in Education: Opportunities, Concerns and Need for Action. *Advances in Mobile Learning Educational Research*, 4(2), 1105-1113

Chen, X., & Liu, Y. (2023). Comparative analysis of AI-assisted and traditional presentations in higher education. *Journal of Educational Technology Systems*, 52(1), 5-24.

Davies, R., & Williams, E. (2024). AI-enhanced presentations in STEM education: A study of student comprehension. *International Journal of STEM Education*, 11(1), 14.

Edeh, M. O. (2020). Integration of Emerging Technologies in Teaching and Learning Process in Nigeria: the challenges. *CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND*

COMPUTER SCIENCES, 1(11), 35-39. Retrieved from https://cajmtcs.centralasianstudies.org/index.php/CAJMTCS/article/view/22

Makinde, O., &Adeleke, J. (2021). Artificial intelligence (AI) adoption and challenges in Nigerian higher education: A case study. *International Journal of Emerging Technologies in Learning (iJET)*, 16(4), 4-19.

National Bureau of Statistics. (2021). Labor Force Statistics: Unemployment and Underemployment Report (Q4 2020). Abuja, Nigeria: NBS.

Nwoke, B. I., Okafor, P. S., & Eze, S. C. (2024). Contextualizing AI tools for Nigerian higher education: Challenges and opportunities. *African Educational Research Journal*, 12(1), 23-40.

Ogunleye, A., Adebayo, O., & Ishola, F. (2022). Time allocation and workload analysis of Nigerian university lecturers. *Journal of Higher Education in Africa*, 20(1), 89-106.

Okoye, K., & Eze, S. (2023). Student-to-lecturer ratios in Nigerian universities: An analysis of trends and implications. *African Higher Education Review*, 15(2), 167-185.

Olatunde-Aiyedun, T.G. & Hamma, H. (2023). Impact of artificial intelligence (AI) on lecturers' proficiency levels in MS PowerPoint, Canva and Gamma in Nigeria. *Horizon: Journal of Humanity and Artificial Intelligence*, 2(8), 1-16.

Oluwaseun, O., & Adeleke, A. (2023). Digital proficiency among Nigerian university lecturers: A comprehensive survey. *Nigerian Journal of Educational Technology*, 12(1), 15-32.

Reuben, B. & Kabilan, M. K. (2024) Assessment of University Lecturers' Readiness to Adopt Artificial Intelligence (AI) Technology in North-East of Nigeria. *International Journal of Advanced Research in Education and Society*, [S.l.], v. 6, n. 2, p. 482-490, july 2024. ISSN 2682-8138.

Russell, S., & Norvig, P. (2016). Artificial Intelligence: A Modern Approach. Pearson.

Samuel, S.O., Akintolure, S.O., & Fasinro, K.S. (2024). The Impact of AI-Driven Personalized Learning on Student Achievement in Higher Education. M.O. Yusuf & H.O Bolaji, Artificial Intelligence for Educational Purposes in School Settings and Workplace: *6th Annual Conference of the Association of Innovative Technology Integration in Education* (AITIE) (pp.156-167)

Thompson, R., Garcia, A., & Lee, S. (2023). Impact of AI-enhanced presentations on student engagement and retention in higher education. *Journal of Educational Psychology*, 115(3), 456-472.