

Integration Of Artificial Intelligence In The Future Of Teaching And Learning Office Technology In Southwest Nigeria Higher Institutions

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Abstract

Artificial Intelligence (AI) is rapidly transforming the landscape of education, making its integration essential for educators to remain relevant in the evolving learning environment. This study explores the integration of AI in the future of teaching and learning Office Technology in higher institutions across Southwest Nigeria. The study employed a descriptive survey design, with a population of 200 respondents drawn from four higher institutions in the region. A self-developed, 4-point rating scale questionnaire titled *Questionnaire on the Integration of Artificial Intelligence in the Future of Teaching and Learning Office Technology (QIAIFTLOT)* was used for data collection. The instrument was validated by three experts and achieved a reliability coefficient of 0.87. Data were analyzed using mean and standard deviation to address the research questions, while a t-test was used to test the hypotheses. The findings revealed significant differences in the current level of AI adoption, its utilization, and the challenges associated with its implementation in Office Technology education. Based on the findings, it was recommended that the government should invest in improving internet connectivity, providing adequate digital infrastructure, and equipping institutions with necessary AI-driven resources to enhance teaching and learning experiences.

Keywords: Artificial Intelligence, Office Technology, Higher Education, Teaching and Learning, Southwest Nigeria

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I. Introduction

The integration of Artificial Intelligence (AI) into education is transforming teaching and learning methodologies worldwide. AI applications, such as machine learning, natural language processing, and intelligent tutoring systems, have the potential to enhance students' learning experiences and improve instructional delivery. In Southwest Nigeria, higher institutions are gradually adopting AI-driven technologies, but the extent and effectiveness of this integration remain unclear.

Crompton and Burke (2023) observed that applications of AI are currently utilized in several fields including governments, education, business, medicine, communication, aviation, and engineering. These technological innovations have permeated teaching and learning, as well as other sectors of academia, fostering effectiveness and efficiency (Chen, et.al, 2020). Education now benefits from the use of artificial intelligence, which also offers new challenges in academic practices (Ouyang & Jiao, 2021; Crompton & Burke, 2023). Applications of AI in education are frequently utilised in teaching, learning, and administration. AI support social learning in many ways such as summarising conversations that a teacher can use to guide students toward goals and objectives in college courses, integrated group teaching based on learning models and facilitating participation in online communities. Artificial intelligence refers to the ability of machines, especially computer systems, to simulate human intelligence processes. It is a body of computational techniques inspired by how humans' senses, perceive, learn and act through their nervous system and/or body. According to Chiu et al. (2023), artificial intelligence (AI) is the ability of digital machines to accomplish tasks typically carried out by intelligent beings associated with various technological disciplines, which include computer vision, speech recognition, machine learning, big data, and natural language processing. Aldosari (2020) explains artificial intelligence as the scientific study of producing machines that behave like people. It includes the following fields: expert stems, speech recognition, neural networks, robotics, and natural language processing. AI is divided into different branches, including big data, machine learning, computer vision, speech, and natural language processing. As used in this study, (AI) in education refers to the application of technologies, such as chatbots, robots, intelligent tutoring systems, and automated assessment of all types of digital artefacts that enhance and augment education.

AI has revolutionised various sectors, including education. The emergence of AI has brought about new concepts in education such as Classroom Robotic Assistant (CRA), Adaptive Learning Systems (ALS), Intelligent Tutoring Systems (ITS), and Virtual Laboratories and Simulations (VLS). CRA provides classroom help to an educator, especially, when he is not available (Ogbonnia, 2017); ALS personalises the learning process; ITS provide interactive and individualised instruction and VLS offers immersive digital experiments (Okunade, 2024). In this regard, Garima and Mudgal (2024) stated that the brick-and-mortar classrooms, physical textbooks and teachers which were representative of the education system are on the verge of integration owing to disruptive technology (AI). As technology continues to advance, the use of AI in education is becoming more prevalent because of its ability to streamline the instructional preparation process and enhance teaching methods as well as improve learning outcomes. With the ability to analyse vast amounts of data and adapt to individual student needs, AI is reshaping the way educators plan and deliver instruction. By utilising AI, educators can create personalised learning experiences for students which are more engaging and effective. AI can provide valuable insights into students' understanding and learning patterns and can automatically generate the course materials and quizzes or tests based on the courses that the teacher prepared. Pan (2022) summarised the contributions of AI in education as follows: planning educational content; preparation of materials; finding misconceptions; personalised instruction to each student; monitoring students; fast feedback to students and learning analytical skills.

Purpose of the Study

This study aims to integrate Artificial Intelligence in the Future of Teaching and Learning Office Technology in Southwest Nigeria's Higher Institutions. The specific purpose:

- i. To examine the current level of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution
- ii. To investigate the utilisation of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution
- iii. To examine the challenges of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution

Research Questions

The research addresses the following questions:

1. What is the current level of AI in teaching and learning of Office Technology at Southwest Nigeria Higher Institution?
2. What is the utilisation of AI in teaching and learning of Office Technology in Southwest Nigeria Higher Institution?
3. What are the challenges of AI in teaching and learning Office of Office Technology in Southwest Nigeria's Higher Institutions?

Research hypothesis

H₀₁: There is no significant difference in the current level of AI in teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

H₀₂: There is no significant difference in the utilization of AI in teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

H₀₃: There is no significant difference on the challenges of AI in teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

Concept of Artificial Intelligence (AI)

Artificial intelligence (AI) refers to the development of computer systems that can perform tasks typically require human intelligence; and the system can learn from data experiences and interactions, enabling them to improve their performance and adapt to new situations. It can also draw conclusions, make decisions and solve problems using logic, rules and patterns. Artificial Intelligence systems can identify and resolve problems often using creative and innovative approaches. The system can interpret and understand data from sensors, images, speech and text, enabling them to understand the world around them. Berglund, et.al (2020), artificial intelligence systems can also comprehend and generate human language, enabling them to communicate with humans; it is a system that uses algorithms to process data, learn from experiences and the system relies on high-quality data to learn, improve and make accurate decisions. AI systems use sensors to perceive the environment and actuators to interact with the physical world. The types of include narrow or weak, general or strong and superintelligence. It is a machine that can be made to simulate aspects of learning.

The Role of AI in Education

Artificial intelligence (AI) has the potential to transform the educational landscape by automating administrative tasks, providing prompt feedback, and customising teaching strategies to meet individual student needs. Furthermore, it can aid with assessment and grading, allowing educators to concentrate on designing curricula and delivering exceptional instruction. It is expected of institutions of learning to innovate in teaching and learning to keep up with new technological advancements (Aldosari, 2020). Artificial intelligence techniques, including machine learning, deep learning, artificial neural networks, natural language processing, and genetic algorithms, have enabled the development of intelligent learning environments that support behaviour detection, model construction, and personalized recommendations for learning materials (Ouyang & Jiao, 2021). The principal objective of artificial intelligence is to facilitate machine information processing that approaches problem-solving as closely as possible to that of human beings. Artificial intelligence is impacting education in two primary ways, according to Aldosari (2020; Klutka *et.al*, 2021):

- (i) Curriculum designed with AI in mind, which can be customised to fit the unique requirements of every learner; it can create individualised learning pathways by analysing student data, including learning preferences, skills, and shortcomings;
- (ii) Automation of Administrative duties: AI can free up educators' valuable time so they can concentrate on instructional activities and student engagement e.g. assigning grades, setting up classes, and maintaining student records can be performed by AI-powered systems: AI-generated emails can notify students of upcoming deadlines, encourage them to sign up for classes, turn in assignments on time, and pay fees on schedule. Furthermore, AI-based ***software is getting better at identifying plagiarised assignments. Artificial intelligence is currently being used in a variety of educational activities.

AI helps instructors determine how well their students understand their lectures gives them the ability to provide the right hints, and works as a teacher for the students and makes them learn concepts easily. Furthermore, initiatives powered by artificial intelligence offer helpful feedback to instructors and students alike. Learners are empowered to tailor their learning to meet their own needs because of the simple and adaptable structure of these AI-influenced environments. Thus, artificial intelligence (AI) is a well-designed technology that can give teachers and students the chance to pursue learning effectively by offering a flexible arrangement, opportunities for cooperation, options, and control over the learning process (Jain & Jain, 2019).

AI in Office Technology Education

Office Technology as a discipline focuses on the use of digital tools for business communication, record-keeping, and administrative tasks.

Office technology education is critical in preparing students for modern workplace demands. With advancements in AI, the traditional learning framework is evolving to incorporate intelligent automation, virtual assistants, and data-driven decision-making tools. This evolution necessitates an analysis of how AI is reshaping office technology education.

AI contributes to office technology education in various ways, including:

1. **Personalized Learning:** AI-driven systems, such as intelligent tutoring systems (ITS), adapt content delivery based on students' learning pace and preferences (Woolf, 2020).
2. **Automated Administrative Tasks:** AI automates repetitive tasks like grading, scheduling, and record management, allowing educators to focus on teaching (Luckin *et al.*, 2018).
3. **Enhanced Decision-Making Skills:** AI-powered analytics tools train students in data analysis, decision-making, and problem-solving (Zawacki-Richter *et al.*, 2019).
4. **Virtual Assistants and Chatbots:** AI-powered virtual assistants facilitate seamless interaction between students and learning platforms, providing instant feedback (Hwang *et al.*, 2020).
5. **Smart Content and Digital Classrooms:** AI curates and recommends study materials, creates simulations, and enables adaptive learning environments (Selwyn, 2019).

Challenges in AI Integration

Artificial Intelligence (AI) in the Nigerian educational system faces a range of challenges that need to be addressed to ensure its effective integration and utilisation. Some of these challenges include:

1. **Infrastructure:** The availability and quality of infrastructure, such as reliable internet access and electricity, as well as availability of computer systems are important prerequisites for implementing AI tools and technologies in education. Nigeria faces infrastructural limitations that can hinder the widespread adoption of AI in the educational system.
2. **Funding:** Adequate financial resources are essential for the development and implementation of AI initiatives. Lack of funding can impede the procurement of necessary hardware, software, and expert personnel needed to deploy AI solutions effectively in Nigerian schools and universities.

3. Awareness and Understanding: Creating awareness and providing a comprehensive understanding of AI among education stakeholders is crucial. Educators, administrators, and policymakers need to be familiar with AI concepts, its potential applications, and its limitations to make informed decisions, develop appropriate policies, and design relevant curricula.
4. Skills Gap: There is a shortage of professionals with expertise in AI within the Nigerian educational system. The lack of qualified AI trainers, data scientists, and engineers hinders the development and deployment of AI solutions. Bridging this skills gap through targeted training and capacity-building programs is necessary to fully leverage AI in education.
5. Ethical Considerations: The ethical implications of AI usage, such as data privacy, security, and algorithmic bias, must be carefully addressed in the educational context. Ensuring that AI systems are transparent, fair, and unbiased is essential to build trust and prevent potential harm.
6. Content Localisation: Many AI-powered education technologies and resources are often developed based on foreign contexts and may not be directly applicable to the Nigerian educational system. Localising AI content, including language, cultural references, and examples, is vital for its effective integration into the Nigerian educational landscape.
7. Resistance to Change: Resistance to change is a common challenge when introducing new technologies like AI. Some educators and administrators may be hesitant to embrace AI due to fear of job displacement or unfamiliarity with the technology. Ensuring proper training, addressing concerns, and showcasing the benefits of AI can help to overcome this resistance.
8. Teacher Training and Readiness: Many educators may lack the necessary training and skills needed to effectively teach using AI tools and technologies. Providing proper training and professional development opportunities to teachers is crucial to harness the full potential of AI in enhancing the teaching and learning experience (Akinyele, Akinlabi & Oduneye, 2018).
9. Digital Divide: There is a significant digital divide between urban and rural areas, as well as between different socioeconomic groups, in Nigeria. This disparity in access to technology and digital literacy skills creates a barrier to the widespread use of AI in education, leading to unequal opportunities for students across the country.
10. Curriculum Adaptation: Adapting the education system's curriculum to accommodate AI-related subjects and skills poses a challenge. Addressing this challenge requires collaboration and coordination between educational institutions, policymakers, and industry experts to ensure that students are equipped with the relevant knowledge and skills needed in the age of AI. Addressing these challenges requires collaboration among government agencies, educational institutions, industry partners, and relevant stakeholders. By overcoming these obstacles, AI can contribute significantly to enhancing the Nigerian educational system, improving learning outcomes, and preparing students for the demands of the future.

II. Methodology

Descriptive survey design was used in the study. The population of the study comprised two hundred (200) in four (4) tertiary institutions in Southwest, Nigeria. The entire population was used because of its manageable size, therefore there was no sampling in the study. The instrument for data collection was a researcher's self-designed 4-point rating scale questionnaire titled: Questionnaire on the Integration of Artificial Intelligence in the Future of Teaching and Learning Office Technology (QIAIFTLOT). The instrument was rated as follows: Very High Extent (VHE, 4 points); High Extent (HE, 3 points); Low Extent (LE, 2 points); and Very Low Extent (VLE, 1). The instrument was validated by three (3) experts and further tested for reliability which produced a coefficient of 0.87. The copies of the instrument were administered to the respondents on a one-on-one basis with the help of four (4) research assistants, one for each institution used for the study to ease the job. Retrieval of the instrument was done immediately after completion. Collected data from the respondents were analysed using mean and standard deviation to answer the research questions and a t-test to test the null hypotheses. For any of the hypotheses to be accepted, the significant level of 0.05 was equal to or less than the P-value.

III. Result

Research Questions

Research Question One: What is the current level of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution?

The descriptive analysis of data collected to answer research question one is presented in Table 1

Table 1: The Mean and Standard Deviation of the level of AI in teaching and learning of Office Teaching and learning of Office Technology

S/N	Level of AI in teaching and learning of Office Teaching and learning of Office Technology	X	SD	Decision
1	AI-powered tools are frequently used for teaching Office Technology in institutions.	3.86	0.79	High Extent
2	Lecturers and students have adequate knowledge of AI applications in Office Technology.	3.28	0.79	High Extent

3	AI technologies improve students' engagement and learning outcomes in Office Technology.	3.30	0.78	High Extent
4	AI-based learning platforms (e.g., virtual assistants, chatbots) are integrated into the curriculum.	3.96	0.78	High Extent
5	AI-supported grading and assessment tools are implemented for evaluating student performance.	3.76	0.78	High Extent
Grand mean		3.63		

The analysis of Table 1, which presents the mean and standard deviation of the level of AI integration in the teaching and learning of Office Technology, indicates a high extent of AI adoption in this field. The mean scores across all five indicators range from 3.28 to 3.96, with a grand mean of 3.63, suggesting that AI-powered tools, AI-based learning platforms, and AI-supported assessment methods are widely utilized. The findings imply that AI is significantly incorporated into the teaching and learning process of Office Technology, enhancing student engagement and improving assessment methods.

Research Question Two: What is the utilization of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution?

The descriptive analysis of data collected to answer research question two is presented in Table 2

Table 2: The Mean and Standard Deviation of the utilization of AI in teaching and learning of Office Teaching and learning of Office Technology

S/N	Utilization of AI in teaching and learning of Office Teaching and learning of Office Technology	X	SD	Decision
1	AI helps students improve research and problem-solving skills in Office Technology.	3.75	0.78	High Extent
2	AI tools improve students' engagement and interaction in Office Technology classes.	3.79	0.78	High Extent
3	AI enhances personalized learning for students in Office Technology courses.	3.75	0.78	High Extent
4	AI helps students improve research and problem-solving skills in Office Technology.	3.94	0.79	High Extent
5	AI applications are integrated into practical exercises and simulations.	3.65	0.77	High Extent
Grand mean		3.78		

The analysis of Table 2, which examines the utilization of AI in teaching and learning Office Technology, indicates a high level of AI integration in this educational context. The mean scores for all listed AI-related benefits range from 3.65 to 3.94, with a grand mean of 3.78, suggesting that AI is utilized to a high extent in enhancing learning experiences. This finding shows that AI plays a significant role in modernizing Office Technology education, enhancing student engagement, and facilitating personalized learning approaches.

Research Question three: What are the challenges of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institutions?

The descriptive analysis of data collected to answer research question one is presented in Table 1

Table 3: The Mean and Standard Deviation of the challenges of AI in Teaching and learning of Office Teaching and learning of Office Technology

S/N	Challenges of AI in teaching and learning of Office Teaching and learning of Office Technology	X	SD	Decision
1	High cost of AI implementation in institutions	3.78	0.79	High Extent
2	Limited AI knowledge among lecturers and students	3.68	0.77	High Extent
3	Lack of training programs on AI for lecturers and students	3.79	0.79	High Extent
4	Inadequate funding for AI-driven education programs	3.75	0.76	High Extent
5	Low student engagement with AI-powered tools	3.76	0.75	High Extent
Grand mean		3.75		

The analysis of Table 3, which presents the mean and standard deviation of the challenges of AI in teaching and learning Office Technology, reveals that all identified challenges are perceived to a high extent. The grand mean of 3.75, along with individual mean scores ranging from 3.68 to 3.79, indicates strong agreement among respondents.

Research Hypotheses

Ho₁: There is no significant difference in the current level of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

Table 4: T-test analysis of the current level of AI in teaching and learning of Office Teaching and learning of Office Technology

Groups	N	Mean	Std. D	T	Df	p-cal	decision
Students	150	14.20	4.15				Not significant

Lecturer	50	13.20	5.42	10.800	198	*0.00	
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(t = 10.800; *p < 0.05; df = 198) * indicates significance difference

The analysis of Hypothesis 1 examines whether there is no significant difference in the current level of AI adoption in the teaching and learning of Office Technology in Southwest Nigeria's higher institutions. The t-test results indicate a statistically significant difference between students' and lecturers' mean scores, with students having a mean score of 14.20 (SD = 4.15) and lecturers having a mean score of 13.20 (SD = 5.42). The calculated t-value (t = 10.800) at 198 degrees of freedom is significant at *p < 0.05, null hypothesis is rejected. This result indicated that there is a significant difference in the current level of AI adoption in the teaching and learning of Office Technology in Southwest Nigeria's higher institutions.

Ho₂: There is no significant difference in the utilization of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

Table 5: T-test analysis of utilization of AI in teaching and learning of Office Teaching and learning of Office Technology

Groups	N	Mean	Std. D	T	Df	p-cal	decision
Students	150	12.28	8.27	15.58	198	*0.00	Not significant
Lecturers	50	13.64	11.86				

(t = 15.58; *p < 0.05; df = 198) * indicates significance difference

The T-test analysis in Table 5 examines the utilization of AI in teaching and learning Office Technology among students and lecturers. The results show a mean score of 12.28 (SD = 8.27) for students and 13.64 (SD = 11.86) for lecturers, indicating slight differences in AI utilization between the two groups. However, the t-value of 15.58 at 198 degrees of freedom (df) and a p-value of 0.00 (*p < 0.05) suggest a statistically significant difference in AI utilization between students and lecturers.

Ho₃: There is no significant difference on the challenges of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institution.

Table 6: T-test analysis of challenges of AI in teaching and learning of Office Teaching and learning of Office Technology

Groups	N	Mean	Std. D	T	Df	p-cal	decision
Students	150	10.64	5.76	21.32	198	*0.00	Not significant
Lecturers	50	14.78	6.08				

(t = 21.32; *p < 0.05; df = 198) * indicates significance difference

The T-test analysis in Table 6 examines the challenges of AI in the teaching and learning of Office Technology, comparing the perspectives of students and lecturers. The results show a significant difference between the two groups, as indicated by the t-value of 21.32 and a p-value of 0.00 (p < 0.05). The mean score for students (10.64, SD = 5.76) is lower than that of lecturers (14.78, SD = 6.08), suggesting that lecturers perceive greater challenges associated with AI integration in teaching and learning compared to students.

IV. Discussion

Data analyzed in Table 4 indicated that there is a significant difference in the current level of AI adoption in the teaching and learning of Office Technology in Southwest Nigeria's higher institutions. The findings agree with Culican (2024) that AI can identify gaps in existing educational materials, suggesting areas for improvement or highlighting emerging trends that curriculum developers can address. Also, it aligns with Gupta and Lee (2018) that AI enhances efficiency and effectiveness, ensuring that educational content remains current, relevant, and engaging. It is also in agreement with the findings of Akinyele & Akinlabi (2024) in which it was observed that AI tools such as vision, prediction systems, data mining, intelligent learning or teaching systems, virtual personalized assistants, AI chatbox, adaptive learning methods etc. can be used to take care of existing differences among students, and areas of improvement.

Table 5 indicates that there is a significant difference in the utilization of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institutions. The finding is supported by Celik et al (2022) that AI systems may be too context-dependent such that using them in varying educational settings can be challenging. The inability to integrate AI into education for instructional preparation may be attributed to various factors. Chiu and Chai (2020) noted that it is due to the lack of technological knowledge of teachers to utilize AI. McCarthy et al. (2016) noted that it is due to a lack of technical infrastructure in schools.

Table 6 indicates that there is a significant difference in the challenges of AI in teaching and learning of Office Teaching and learning of Office Technology in Southwest Nigeria Higher Institutions. This means that the challenge of utilizing artificial intelligence for personalized instruction is not peculiar to a particular gender. In other words, it affects educators irrespective of gender. The reason could be that educators are consistently pressured to quickly adapt to dynamic trends in society. In this regard, the finding is supported by the United Nations Educational, Scientific and Cultural Organization (2019) that rather than addressing the existing problems and issues that teachers face, they are made to promote new ways of organising teaching that collide with mainstream traditional practices, often without rigorous evaluations supporting the claimed benefits of new solutions.

V. Conclusion And Recommendations

The integration of Artificial Intelligence (AI) in education is revolutionizing teaching and learning methods, particularly in the field of Office Technology. AI has demonstrated its potential to enhance instructional delivery, improve student engagement, and streamline administrative tasks. The findings of this study indicate that AI is being increasingly adopted in higher institutions in Southwest Nigeria, yet challenges such as inadequate infrastructure, limited AI knowledge, and funding constraints persist. While AI presents numerous opportunities for innovation in education, addressing these challenges is crucial for its effective implementation.

To maximize the benefits of AI in Office Technology education, the following recommendations are proposed:

1. **Infrastructure Development:** The government and educational institutions should invest in improving internet connectivity, providing modern computer systems, and developing robust digital infrastructure to support AI integration.
2. **Digital Literacy Programs:** Schools should implement comprehensive digital literacy programs to equip both students and educators with the necessary skills to effectively utilize AI tools. These programs should bridge the digital divide between urban and rural areas.
3. **Teacher Training and Capacity Building:** Regular training workshops and professional development programs should be organized for educators to enhance their understanding and application of AI in teaching. This will ensure that AI is effectively integrated into instructional practices.
4. **Curriculum Enhancement:** AI-related subjects should be incorporated into the national curriculum, and relevant learning resources should be developed to support AI-driven education. This will help students acquire essential AI skills for the modern workforce.
5. **Public-Private Partnerships:** Collaboration between government agencies, educational institutions, and industry stakeholders should be strengthened to provide funding, technical expertise, and resource support for AI education initiatives.
6. **Ethical and Regulatory Frameworks:** Policymakers should establish guidelines to address ethical concerns surrounding AI use in education, including data privacy, algorithmic bias, and the responsible deployment of AI technologies.
7. **Awareness and Change Management:** Institutions should actively engage educators, students, and stakeholders in discussions about the benefits of AI to reduce resistance to change and encourage wider adoption of AI-powered teaching and learning solutions.

By implementing these recommendations, AI can be effectively leveraged to transform Office Technology education, enhance learning outcomes, and prepare students for future technological advancements.

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