



ARTIFICIAL INTELLIGENCE AND DIGITAL CONNECTIVITY FOR MANAGEMENT OF MATERIAL IN HUMAN RESOURCES IN EDUCATION



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Abstract

The integration of Artificial Intelligence (AI) and Digital Connectivity (DC) in education has the potential to revolutionize the management of material and human resources in Nigerian educational institutions. This paper examines AI and DC in Nigerian education, it discusses the role of AI in optimizing material resources. It pinpoints the roles of AI and DC in material and human resource management, and enhancing teaching and learning experiences, highlighting their benefits and challenges in enhancing human and material resource management. It reveals that DC is important in facilitating the adoption of AI in education institutions. The paper concludes that the integration of AI and DC in education has the potential to revolutionize the management of material and human resources in Nigerian educational institutions and recommends that stakeholders should invest in AI and DC infrastructures, relevant policies that will help to harness full potentials of AI and DC should be developed and, educators should be effectively trained on the use of AI and DC.

Keywords: Artificial Intelligence, Digital Connectivity, management, human resource, material resource.

Introduction

The global education landscape is rapidly evolving as technological innovations redefine traditional systems of teaching, learning, and administration. Among the most transformative forces in this digital age are Artificial Intelligence (AI) and Digital Connectivity (DC), which offer unprecedented opportunities to improve the efficiency, transparency, and responsiveness of education management systems. These technologies are particularly vital in addressing the chronic challenges of educational resource management—both human and material—in developing nations like Nigeria. As AI continues to revolutionize decision-making processes and DC expands access to information and services, their integration into educational systems holds significant promise for optimizing operations, minimizing wastage, and enhancing educational outcomes.

In Nigeria, the management of educational resources faces significant obstacles, including teacher shortages, inefficient deployment of personnel, inadequate training systems, and poorly maintained inventories of teaching and learning materials. According to the Universal Basic Education Commission (UBEC), there is a consistent mismatch between the supply and demand for qualified teachers across states, compounded by irregular data on staffing needs and deployment patterns. Similarly, material resources such as textbooks, laboratory tools, and digital equipment are often misallocated due to the absence of real-time data and integrated logistics systems. These deficiencies are further aggravated by bureaucratic inefficiencies and the lack of digital infrastructure, especially in rural and underserved regions.

Artificial Intelligence offers practical tools to address these challenges by enabling the automation of resource planning, monitoring, and evaluation processes. AI-driven systems can analyze large volumes of data to predict resource needs, recommend optimal staff deployment, and track the performance and attendance of teachers and learners (UNESCO, 2023). For example, predictive analytics can identify regions at risk of teacher shortages and recommend data-driven reallocation strategies. Additionally, AI-powered chat bots and virtual assistants are increasingly being used for

administrative support, reducing the burden on school managers and enhancing communication with stakeholders.

Simultaneously, Digital Connectivity plays a critical role in bridging the access gap between central education authorities and schools across Nigeria. With increasing mobile and internet penetration, particularly through government and private sector investments, DC facilitates real-time communication, access to online training platforms, and the digitization of administrative records (GSMA, 2023). Platforms such as the Nigeria Learning Passport, a digital learning platform co-developed with UNICEF, demonstrate the growing feasibility of digitally connected educational ecosystems. When integrated with AI tools, these platforms can offer tailored learning pathways, performance analytics, and automated reporting systems that inform policy decisions at various administrative levels. This paper therefore explore the role of Artificial Intelligence and Digital Connectivity for Management of Material and Human Resources in Education, Nigeria

Conceptual Clarification.

The author clarifies the following concepts within the context of this paper:

Artificial Intelligence

Artificial intelligence (AI) refers to the development of computer systems that can perform tasks that would typically require human intelligence, such as learning, problem-solving, decision-making, and perception (Russell, S. J., & Norvig, P. 2020). Similarly, Kaplan & Haenlein, (2020) define Artificial intelligence (AI) as a field of computer science that focuses on creating intelligent machines that can think and act like humans, capable of learning, reasoning, and problem-solving. Artificial intelligence (AI) is an advanced technology that simulates human intelligence processes using machine learning algorithms, neural networks, and natural language processing (NLP) and it is transforming all educational disciplines. AI can help improve the learning process, enhance student outcomes, and automate administrative tasks. AI is the theory and development of computer systems that can perform tasks that used to be human intelligence. AI is an umbrella term that encompasses many technologies, including machine learning, deep learning, and natural language processing (NLP)

Digital Connectivity

Digital connectivity refers to the ability to access digital services, applications, and online platforms, facilitated by physical infrastructure and networks. It encompasses both mobile and fixed internet connections, and is increasingly vital for economic and social participation. According to Ajiboye & Adetimirin, (2020), Digital connectivity is the backbone of the digital economy, enabling businesses, governments, and individuals to access and share information, communicate, and conduct transactions online. Digital connectivity is a critical enabler of economic growth, social development, and innovation, allowing individuals and businesses to access new markets, services, and opportunities. (Adebayo, F. A., & Olasina, O. O. 2021, p. 15) Digital Connectivity could also refers to the ability of individuals and organizations to access and use digital technologies, such as the internet, mobile phones, and social media, to communicate, access information, and conduct transactions. Digital Connectivity is important because it facilitates access to education, healthcare, and other essential services, particularly in remote areas. Digital connectivity is essential for the adoption of AI in educational institutions because it enables:

Seamless Communication: DC facilitates communication and collaboration among stakeholders, including teachers, students, and administrators.

Access to Resources: DC provides access to digital resources, including online libraries, educational software, and other digital tools.

Data Exchange: DC enables the exchange of data, facilitating the use of AI-powered systems to analyze student performance, track progress, and identify areas for improvement.



Human and Material Resources in Education

Human resources refer to the people who work within an organization, including their skills, knowledge, and experience. In other word, Human Resources represent the individuals within an organization who possess skills, knowledge, and experience that are valuable to the organization's operations. These resources are unique because they can think, evaluate, adapt, and form groups, unlike other resources. Human resources include Employees, staff, and personnel

Material resources, on the other hand, encompass the physical assets of an organization, such as equipment, facilities, and supplies. Material resources are the tangible assets of an organization that are used in the production of goods or services. They are the tangible items used to achieve the goals of organization. They include equipment, machinery, buildings, vehicles, textbooks, educational media (library media print, non-print, and electronic resources), computer software, videotapes, films, DVDs,. Material resources are essential for the smooth functioning of an organization and for achieving its objectives. Usman (2016), affirms that material resources are the tangible resources that can easily be seen and observed in any educational institutions such as classrooms, staff office, vehicles, health centres, libraries, laboratories, instructional facilities and so on, which directly and indirectly contributes to the achievement of educational goals and objectives. In essence: Human resources are the workforce, while material resources are the tools and assets that enable that workforce to function effectively.

The Role of AI and DC in Human Resources Management in Education.

Today, the HR department is moving towards a digital revolution and using various methods to streamline resources using big data analysis, artificial intelligence and cloud computing. (Amla and Malhotra, 2017) Most of the organizations, educational organization inclusive have used artificial intelligence or digital technologies such as chat, machine learning and robotic process automation in HR management to support recruitment, screening, onboarding and interviewing etc. is artificial intelligence in HR management;

1. Recruitment: A researcher (Amla and Malhotra, 2017) defined in his article that only 40 percent of companies and industries use artificial intelligence. Organizations such as SAT, Facebook and GE use digital technologies to screen, interview and identify new talent for their internal recruitment. Through artificial intelligence, the hiring manager can review the application and the applicant will receive a quick response. A chat box system or auto responder plays an important role in solving questions and problems related to an organization's recruitment process.
2. Screening and Interview Process: Artificial intelligence helps automate the interview process by screening them through verbal or speech pattern studies. Any software can be used to organize a digital interview, and artificial intelligence can also help improve the candidate experience. Tools like Amy and Clara are used to schedule interviews and workshops.
3. Reduce Administrative Burden: Organization needs HR personnel to work multiple times while companies using technology and artificial intelligence are trying to reduce workload that Artificial intelligence offers
4. Selection: Researcher (Rajesh, Kandaswamy and Rakesh, 2018) studied that with the help of artificial intelligence, the HR manager can track the right candidate in a short time, and technology helps to find the right one - In the organization, the HR- a manager must perform multitasking roles, where companies using technology and artificial intelligence try to reduce the workload. Artificial intelligence offers solutions to problems and helps to increase the efficiency of HR in the organization candidate needs difficulty.
5. Reduce discrimination: Today artificial intelligence is used to reduce favoritism and increase workplace transparency. In this way, the organization can choose the CV. Artificial intelligence applications can be used to analyze job descriptions (Rathi, 2018).

6. Increase efficiency: Artificial intelligence helps reduce redundancies in the workplace. Various robotic tasks were performed to increase the efficiency of the workplace. The robot task includes data collection, reporting, data copying, identifying required data from existing data, processing, data collection for HR and payroll systems, etc.

7. Enriching workplace learning: Today computers and digital technology can handle everything behind it. Industry can use computers and modern technology to manage data analysis and give real-time feedback in trainings, change procedures according to progress and responses received from industries (Riebli, 2018). To save time, companies have used Microsoft 365, which helps employees work and increase efficiency in the workplace.

Benefits of artificial intelligence in HR

1. Reduce the administrative burden in the company.
2. It helps in acquiring talent and finding the right candidates for a job
3. Artificial intelligence helps in predicting employee retention in the workplace.
4. He can overcome human limitations and act accordingly
5. There is less chance of error.
6. It keeps the work flow in various departments.
7. Artificial intelligence enables companies to get accurate results.
8. It increases employee engagement in the workplace.
9. This reduces bias in decision making.

Challenges of Artificial Intelligence for Management of Human and Material Resources in Education.

Job Displacement: While AI may displace some jobs, it is expected to create new roles and opportunities, requiring HR professionals to develop new skills and adapt to changing workforce needs (Gartner, 2025).

Bias and Ethics: AI systems can perpetuate biases if trained on biased data, highlighting the need for careful design, implementation, and monitoring of AI systems.

Challenges and limitations of AI and DC in Education

Despite the potential benefits of AI and DC in education, there are several challenges and limitations to consider:

Infrastructure: Inadequate infrastructure, including poor internet connectivity and limited access to digital devices, can hinder the adoption of AI and DC.

Training and Development: Educators may require training and development to effectively use AI-powered systems and digital tools.

Equity and Access: The adoption of AI and DC may exacerbate existing inequalities, particularly for students from disadvantaged backgrounds.

Conclusion

The paper concludes that the integration of AI and DC in education has the potential to revolutionize the management of material and human resources in Nigerian educational institutions. By doing so, they can improve the quality of education, enhance teaching and learning experiences, and prepare students for success in the digital age.

Recommendations

The paper therefore recommends among others that;

Stakeholders should invest in AI and DC infrastructures,

Relevant policies that will help to harness full potentials of AI and DC should be developed and,

Educators should be effectively trained on the use of AI and DC.



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