DIGITAL TRANSFORMATION AND EDUCATIONAL ADVANCEMENT IN IMO STATE: CHALLENGES AND OPPORTUNITIES IN AI INTEGRATION.

[1]IWEJUO, CHRISTOGONUS AMARA, [2]EMANA, INEMESIT EDEM *Ph.D* **[3]IHEKWOABA, CELESTINE KELVIN** *Ph.D*

[1]*Department of Educational Foundations & Administration, Alvan Ikoku Federal University of Education, Owerri*
chrisiwejuo@alvanikoku.edu.ng 08037766221
[2]*Department of Sociological Foundations of Education, University of Uyo, Nigeria*
iemana@uniuyo.edu.ng 08031101956
[3]*Department of Educational Psychology, Alvan Ikoku Federal University of Education, Owerri.*

Abstract

The advent of Artificial Intelligence, AI as a new trend in knowledge production virtually in all fields of human life is an in-thing in the present times. AI is what every individual and institution must embrace. The study adopted a mixed-method design for data collection. The concurrent data collection was by interview and close observation, while quantitative data were collected by questionnaire. An AI-Knowledge Questionnaire (AIKQ) was formulated to ascertain the level of knowledge and AI integration by both teachers and students in the upper basic schools in Imo State. Data collected were tabulated and analyzed using Mean Rating Statistics at 2.5 benchmark. From the results of the analysis, it is quite obvious that there is very poor knowledge and incorporation of AI in the educational system in the state under study. Hence, the State is yet to embrace AI into her educational system. Predictions by AI experts were projected and recommendations made.

Keywords: Artificial Intelligence (AI), Information Technology (IT), Integrate, Social Change

Introduction

One of the major features of the social system is its dynamic nature; wherein things and events with technology do change and evolve. This social change is natural and also can be induced by several uprising forces. The Encyclopedia Britannica (2024) defines social change as the alteration of mechanisms within the social structure, characterized by changes in cultural symbols, rules of behaviour, social organizations or value systems. Kendall (2004) defines it as the alteration, modification or transformation of public policy, culture or social institutions over time.

Social change occurs in tune or response to adapt or address the potential forces that cause the changes. These forces may include collective behaviour or social movements, physical environmental forces, population change, as well as technology. As life goes on the population of the people increases and several changes keep arising in social interactions, culture and social structure of a society. In most cases, countries experiencing the most rapid increases in population have a less-developed infrastructure to deal with those changes.

This change affects every other aspect of social life and institutions. For instance, Kendall (2004) reveals that a shift in population distribution in the United States from central cities to sub-urban and exurban areas had produced other dramatic changes. Central cities according to her have experienced a shrinking tax base as middle-and upper-middle-income residents and businesses have moved to sub-urban and outlying areas. As a result, schools and public services have declined in many areas, leaving those people with the greatest needs with the fewest public resources and essential services. The changing composition of the U.S. population has resulted in children from more diverse cultural backgrounds entering school, producing a demand for new programs and changes in curricula. This referenced scenario in the U.S is quite obtainable in every other country and city, and is a strong force for social change.

Technology is another important force for social change. In some ways, technological advancements and breakthrough has made lives much easier. This cuts across all works of social system such as education, agriculture, communication, health, business, transportation etc. though there may exist several disadvantages therein.

Advances in communication and transportation have made instantaneous world-wide communication possible but have also brought old belief systems and the status quo into question as never before. Today we are increasingly moving information instead of people-and doing it almost instantly (Kendall, 2004). Advances in science and technology experienced in countless areas of life have contributed to dramatic changes in the social world. This however will continue to develop as more researches are conducted every day by scientists and technologists. In agriculture for instance, food production has increased with some better qualities in both yield and content.

Petersen (1994) states that genetically engineered plants have been developed and marketed in recent years, and bio-chemists are creating potatoes, rice and cassava with the same protein value as meat. Also, advances in medicine have made it possible for those formerly unable to have children to procreate; women well beyond menopause are now able to become pregnant with the assistance of medical technology. It has also improved standard of life and health, and hence, increased lifespan.

Technological advancement has brought about complex and sophisticated machineries and computers which do tremendous works in industries and all works and of life and have helped in mass production of products to sustain the ever increasing world population. In education these advanced technologies have enhanced learning in various ways, making the learners including those with special needs to assimilate ideas at ease and at one's pace of learning. One of the most advanced and latest technologies now in education and other fields is the Artificial Intelligence, AI.

Concept of Artificial Intelligence

Microsoft Encarta (2009) defines Artificial Intelligence (AI) as the study and engineering of intelligent machines capable of performing the same kinds of functions that characterize human thoughts. Artificial Intelligence has been conceptualized and premeditated by the ancient scientists, but the advent of digital scientists, but the advent of digital computers in the 20th century brought AI into the realm of possibility. AI was conceived as a field of computer science in the mid-1950s. The term AI has been applied to computer programs and systems capable of performing tasks more complex than straightforward programming, although still far from the realm of actual thought. While the nature of intelligence remains elusive, AI capabilities currently have far-reaching applications in such areas as information processing, computer gaming, national security, electronic commerce, and diagnostic systems (Microsoft Encarta, 2009).

The first AI conference was held at Dartmouth College in New Hampshire in 1956. This conference inspired researchers to undertake projects that emulated human behaviour in the areas of reasoning, language comprehension and communications.

Coursera (2024) describe AI to cover a wild range of technologies that power many of the services and goods we use today. AI is used as an umbrella term that encompasses a wide variety of technologies, including machine learning, deep learning and natural language processing. Although the term is commonly used to describe a range of different technologies in use today, many argue on whether these actually constitute artificial intelligence.

Some Examples of Artificial Intelligence

According to Coursera (2024), the humanoid robots that are associated with AI have not yet existed, the likely machines one may have interacted with are machine learning powered services and at the simplest level, machine learning uses algorithms trained on data sets to create machine learning models that allow computer systems to perform tasks like making song recommendation or translating text from one language to another.

Some of the most common examples of AI in use today include;

- **ChatGPT**: This uses large language models (LLMs) to generate text in response to questions or comments posed to it.
- **Google Translate**: This uses deep learning algorithms to translate text from one language to another.
- **Netflix**: This uses machine learning algorithms to create personalized recommendation engines for users based on their previous viewing history.
- **Tesla**: It uses computer vision to power self-driving features on their cars.

Artificial Intelligence in Education

AI is currently used in and applied in virtually all works of human life. Education is not left in the application of AI. Hence, the tune of AI is moving towards the possibility of replacing traditional teaching jobs with AI-powered machines.

Clugston (2024) refers AI in education as the use of computer systems that can perform tasks typically requiring human intelligence to enhance learning experiences, streamline administrative processes and support educators. Nowadays, the use of AI has endured and become so increasingly demanded that its effects on education calls for both enthusiasm and caution, Clugson (2024) further explains.

Many scholars advocate for greater use of AI as it offers great opportunities for personalized learning, by bringing new ways to teach. On the other hand, there are still worries about its disadvantages such as privacy, fairness and the possibility of replacing traditional teaching jobs (Clugston, 2024).

The personalized learning offers wide ranges of opportunities for the learner to assimilate contents and at his own pace and learning styles, ensuring that each learner receives the attention and resources he needs to succeed (Graesser and D'Mello, 2012). In addition to personalized learning, AI can assist educator in performing some administrative roles. This helps immensely in reducing the time spent on repetitive works and helps teachers to perform more quality instructions and student engagement. AI-powered tools can also provide assessment parameters for student's performance and progress, enabling early intervention for those who may be struggling and recognizing those who excel. With AI in education new innovations in methodology have evolved, and enabling, interactive learning environments created to facilitate intuition. Interestingly, as AI continues to advance, its potential to transform education increases by making it more accessible, flexible, efficient and personalized learning potentials increase (Luna, 2024).

Advantages of Artificial Intelligence in Education

The application of AI in education has its numerous advantages as well as some limitations. Some of the advantages of AI in education may include but not limited to:

Personalized Learning: This helps immensely in tailoring education to meet individual learner's needs, interests, and learning styles and pace, using various instructional strategies and technologies. It exposes instructions to the learner in consideration of his profiles – strengths, weaknesses and goals. It also

ensures that the learning objectives are achieved by aligning instruction with specific skills and knowledge. Personalized learning also makes room for adaptive assessments whereby lesson is presented to adjust difficulties and content based on student's performance. Of course, personalized learning makes for flexible pacing whereby the learner learns at his own pace. It presents learning also in multi-modal approach by incorporating diverse teaching methods and materials.

Adaptive Assessment: This is a type of assessment that adjusts its difficulty, content and/or format in real-time based on a student's performance, using algorithms and data analytics. It enables the accuracy of measurements and results as well as knowledge. It makes learning much easier by reducing anxiety and stress. It encourages student engagement and motivation, as well as enhances feedback and self-awareness; (Luckin, 2018). It gives the teacher efficient and reliable assessment and grading without any form of bias. It enhances the accuracy of understanding student strengths and weaknesses. It provides automated test administration and improves student-teacher interaction (Baker and Rossi, 2019).

Intelligent Tutoring Systems: This is a computer-based system that presents one-on-one personalized instruction and gives instant feedback so accurately and as real as it were the teacher in real-live scenario, ensuring the learner has personalized experience, real-time feedback and assessment (Heffernan and Koedinger, 2015).

Automated Grading: Whereby the students' examinations, quizzes and all the assessment assignments are evaluated accurately and efficiently without making use of manual grading.

Other outstanding benefits of using AI in education include: Enhanced accessibility, data-driven insights, virtual learning environment, natural language processing for learning language etc. (Woolf and Cunningham, 2013).

Disadvantages Of Artificial Intelligence in Education.

However, in spite of the numerous advantages the new trend of technology is offering, AI also has several demerits to education. These include some technical dimensions as outlined by Woolf and Cunningham (2013) such as;

i. Technical issues and errors
ii. Potential for system crashes and downtime
iii. Compatibility problems with existing systems.
iv. Dependence on internet connectivity.

Some pedagogical limitations such as:

i. Lack of human touch and empathy
ii. Limited contextual understanding
iii. Insufficient feedback and guidance
iv. Neglect of socio-emotional learning.

Some accessibility concerns such as:

v. Digital divide and unequal access
vi. Bias in AI algorithms and data
vii. Exacerbating existing inequalities
viii. Limited accessibility for students with disabilities
ix. Cultural and linguistic barriers.

Some ethical concerns such as;

x. Data privacy and surveillance
xi. Potential for bias and discrimination.
xii. Lack of transparency in AI decision-making.
xiii. Risk of cheating and academic dishonesty.
xiv. Unintended consequences of AI-driven education (Baker & Rossi, 2019).

Some teacher and student concerns such as;

xv. Job displacement and teacher replacement.
xvi. Changes in teacher roles and responsibilities.
xvii. Student dependence on AI for learning.
xviii. Potential for decreased critical thinking
xix. Impact on student-teacher relationships.

Major Challenges in AI Integration in Nigeria Education

Nigeria like some other third world countries is still far in the realities of advanced technologies in their educational system. The concept of AI still stands as an illusion, even though some higher institutions have started to incorporate digital technology in their infrastructure. Yet, the adequate integration of AI in our education remains an uphill task.

This is faced with a lot of challenges such as;

Infrastructure-Related Limitations

i. Very poor internet connectivity and bandwidth.
ii. Inadequate computer hardware and software.
iii. Power outages and epileptic electricity supply.
iv. High cost and limited access to digital devices such as computers, tablets and smartphones.

Human Capacity Challenges

i. Lack of or poor teacher training and capacity building for AI integration.
ii. Poor awareness and limited understanding of the concept among teachers.
iii. Inadequate or shortage of skilled IT professionals in education.
iv. Resistance to change from traditional teaching methods.
v. Lack of interest and consciousness in digital advancement.

Curriculum and Content Issues

i. Very poor or no alignment of AI driven education with Nigerian curriculum standards.
ii. Lack of development of AI-based educational content relevant to Nigerian context.

Policy and Regulator Matters

i. Lack of policy framework for AI integration.
ii. There is no regulatory framework for AI in education.
iii. Problems of data protection and privacy concerns.

Socio-Economic Problems

i. The cost effect is enormous and cannot be affordable for most states and private entities.
ii. Digital divide and unequal accessibility between the rich and poor.
iii. Limited financial resources for AI investment.
iv. Societal skepticism and acceptability issues.

Cultural and Language Challenges

i. It is still a huge challenge in integrating AI with local languages and cultural contexts.
ii. Resistance to AI due to cultural faith and ignorance.

Research Design and Data Collection

The study adopted a mixed-methods design whereby the researchers conducted concurrent data collection approach in collecting both qualitative and quantitative data. The researchers visited ten (10) schools out of the 300 existing junior secondary schools (upper Basic) in Imo State. The samples were randomly selected across the educational zones. Ten teachers and ten students were selected for data collection.

Instrument for quantitative data collection was an Al-Knowledge Questionnaire (AIKQ) formulated to ascertain the level of knowledge and integration of AI in the school from both teachers and students. One questionnaire was for the teachers while the other was for the students; while qualitative data collection was by observation and interview.

Research Questions

i. To what extent are the teachers knowledgeable and skilled in IT and AI concept?
ii. To what extent is AI integrated in the school systems?

Research Question 1: To what extent are the teachers knowledgeable and skilled in IT and AI concepts?

Table 1: Showing the level of knowledge and skills of Teachers and IT and AI.

S/N	*Item*	*VHE*	*HE*	*LE*	*VLE*	*Mean*	*Decision*
1	I have in-depth knowledge of the concept of AI and IT	04 16	06 18	20 40	70 70	1.4	
2.	I have internet enabled computer for teaching in the class	2 8	04 12	08 16	86 86	1.2	
3	There is good internet facility in my school	0 0	0 0	0 0	100 100	1.0	
4.	Capacity building workshops are always conducted for us on IT and AI	4 16	6 18	10 20	80 80	1.3	
5	There is strong security apparatus to self-guard the equipment if installed	3 12	7 21	12 24	78 78	1.3	
						1.24	

From the data above, there is obvious pointer that there is very poor knowledge and skill on IT and AI among most teachers in the public schools in Imo State as issues like poor government intervention in providing internet facilities, computer hardwares and software as well as strong security has been seen as the major constraint. Also, the teachers are not regularly exposed to training on IT, making them to be very far behind in IT and AI area.

Research Question Two: To what extent is AI integrated in the school system?

Table 2: Showing the Level of AI Integration in the School System.

S/N	*Item*	*VHE*	*HE*	*LE*	*VLE*	*Mean*	*Decision*
1	Do you know the meaning of IT and AI?	08 32	12 36	21 42	59 59	1.69	
2.	Does your school have good computer library?	2 8	2 6	7 14	89 89	1.17	
3	Do you learn computer regularly with practice	0 0	4 12	6 12	90 90	1.14	
4.	I have access to internet phone, tablet or computer for learning at home	8 32	10 30	14 28	68 68	1.58	
						1.4	

From results of the analysis in Table 2, it is quite obvious that the level of AI integration in the state is nothing to write home about. Where computer studies is taught at all, it is only on theory and no practical work exposed to the students. Only a few homes can afford to provide their children with internet enabled devices like smartphones and computers.

Discussion

There is no doubt that Nigeria is still far behind in the area of integrating AI in her educational frontiers. There is no goodwill to enact policies that will ensure the integration of AI in the school system. Our political leaders and stakeholders in education are yet to wake up to understand that AI is an in-thing now and had come to stay. The non-application of AI and IT in our school system will still ever keep us at the background as long as the current realities in IT and AI prevail. The earlier we wake up from this slumber, the better for us.

Some Future Predictions on AI

- Luckin (2018) predicts Ai will revolutionize education by providing personalized learning experiences. But warns against over-reliance on Ai, ensuring human teachers' roles evolve, not disappear.
- Baker and Rossi (2019) foresee AI-driven adaptive learning systems becoming increasingly prevalent. They caution against relying solely on AI for education decision-making.
- Heffernan and Koedinger (2015) envision AI-powered intelligent tutoring systems transforming math education and emphasize the need for rigorous testing and validation of AI-driven educational tools.
- Woolf and Cunningham (2013) predict AI will enable real-time feedback and assessment and emphasize the importance of human AI collaboration in educational decision-making.
- Grasser and D'Mello (2012) envision AI-powered cognition architectures enhancing learning outcomes. They warn against potential biases in Al-driven educational systems.

Recommendation

Without controversy, education remains a viable tool for nation building and societal development. The government and stakeholders in education should endavour to equip the schools with modern facilities as to improve the standard and quality of our education to measure with the international best practices.

There should be regular in-service training for the teachers on IT and AI to equip them with the necessary skills. Therefore, internet facilities should be installed in every school with adequate computers and IT gadgets. Also, strong security school be ensured as to preserve and self-guard the equipment from being stolen or destroyed.

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