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The Nexus Between Artificial Intelligence (AI) and Educational Creativity in the Post-COVID-19 Era in Nigeria

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Abstract
The relationship between Artificial Intelligence and educational creativity is the subject of much research globally in the Fourth Industrial Revolution (4IR). Scholars have researched on its impact on the educational system in the post-COVID-19 era in Nigeria. However, this paper aims to examine the nexus between AI and educational creativity. This is the lacuna addressed by this paper. To lessen the danger of the virus dispersal, social gatherings and relocation were proscribed. The epidemic also caused standard classes (face-to-face) to be interrupted, and education was temporarily suspended. Due to the epidemic, potential resolutions and alternatives are presently being researched to resolve the crisis in the educational system. This paper aims to see how Artificial Intelligence can help educational creativity in the post-COVID-19 era in Nigeria. The paper examines current research literature that explore the impact of Artificial Intelligence on educational creativity in the post-COVID-19 era. A systematic literature review was employed, and the Disruptive Innovation Theory forms the theoretical framework. The findings show that Artificial Intelligence plays a major role in educational creativity, with emerging technologies being used to pursue education in the COVID-19 and the post-COVID-19 era. Furthermore, Artificial Intelligence could not replace humans in the administration of education; rather, it will improve the accessibility to

quality education through the use of digital technologies irrespective of time and geographical location. Conclusively, Artificial Intelligence enhances educational diversification and hybrid in Nigeria, especially in this age of digital technology for online classes. The paper recommends that policymakers, business captains, and individuals must leverage the opportunity that arises from the usage of Artificial Intelligence to fully harness the potential of digital transformation and sustainable development in the educational sector of Nigeria.

Keywords: Artificial Intelligence, Educational Creativity, Distance Learning, New Approach, Hybrid Classes Nigeria, Post-COVID-19 Era,

Introduction

The impact of Artificial Intelligence (AI) on educational creativity in this post-COVID-19 era can never be over-emphasized. Artificial intelligence (AI) has swiftly established itself as a revolutionary force in a wide variety of industries, including education. The evolution of AI has resulted in an array of developments and innovations that have impacted many aspects of human life. As an essential factor in societal development and individual improvement, educational creativity has had momentous advantages from AI innovations. The incorporation of AI in educational creativity is changing how students learn, teachers educate, and institutions work. By personalizing learning proficiencies, programming organizational responsibilities, and delivering real-time feedback, AI is transforming the educational landscape, connecting gaps, and inspiring a more all-encompassing and efficient education environment (Kamalov, et. al. 2023). Given the significance of incorporating AI in education, there is a need to deliberate on its implications.

The objective of this paper is to study the potential impact of AI on educational creativity based on a review of the existing literature. The prospective applications of AI in education comprise personalized learning, intelligent teaching systems, automation of assessment, and teacher-student collaboration (Wollny, et. al., 2021). Personalized scholarship is possible given the scalability of AI to the entire scholar population. AI algorithms like reinforcement learning can be used to

systematically learn about the peculiar needs of a scholar and adapt the learning procedure correspondingly. In association with personalized scholarship, intelligent education systems can be developed that can actively communicate with scholars, giving appreciated responses. Another impactful facet of AI is the computerization of the assessments. Computer vision and natural language processing systems can be combined to systematically grade homework, quizzes, and exams. Automated grading will provide great assistance to teachers, giving them more time to spend with scholars. AI can also be beneficial in expediting teacher-student partnerships by providing several feedback and analytics (Kamalov, et. al., 2023).

The application of AI in educational creativity reveals the potential for enormous benefits that are made conceivable by intellectual systems. The impact of AI can be perceived in enhanced learning outcomes, time and cost proficiency, worldwide access to quality learning, and other benefits. Personalized education and intellectual education systems can aid develop learning results for scholars, particularly in underserved populations. The worldwide reach and scalability of AI will allow scholars from both industrialized and emerging countries to benefit from better scholarship experiences. Automatic grading will have massive cost- and time-saving advantages in learning. Presently, around 40% of teachers' time is spent on grading and connected undertakings. Without the weight of grading, teachers will be able to spend more time with scholars and provide more learning support (Kamalov, et. al., 2023).

While the usage and benefits of AI in education can portray an appealing picture, it is vital to be conscious of the possible dangers of introducing autonomous systems in education. Since students are more vulnerable than adults to misinformation, the usage of AI in learning should be correctly pretested and judiciously supervised. Prospective problems comprise information confidentiality and safety, bias and discrimination, and the teacher-student connection. Certain applications of AI like personalized scholarship need students' data. For example, knowing that a scholar has a learning disability or a mental

health concern will allow AI to choose the suitable method and customize its content correspondingly. While scholars' data can be used for remarkable advantage, it can also be vulnerable to confidentiality and safety problems (Adeyeye, et al., 2021).

Anonymizing and encoding the scholarly information will lessen some of the challenges. Conversely, an all-inclusive approach is obligatory to tackle this concern. Another vital concern is partiality and discrimination. Since AI is trained on public information it can be open to the biases that exist on the internet. Additionally, AI algorithms can also accidentally learn bias on their own. Since there is a momentous amount of entropy in the AI algorithms, their actions could be unpredictable. Lessening the amount of bias is one of the main problems in applying AI in learning (UNESCO, 2023).

Novel technology has traditionally held the potential for abuse. For instance, the discovery of nuclear fission produced the devastating nuclear bomb. The advent of the internet produced the dark web, where illegal and illicit actions can be concealed from the government (Deepanjah & Adesh, 2022). On the other hand, civilization has been able to limit the potential for the misuse of technology through global collaboration and law enforcement. In general, the benefits of this novel technology surpass its hazards. Rather than discontinuing or thwarting the innovation of novel AI technology in learning, it will be more helpful, on balance, to incorporate it into the curriculum. Eventually, the only way forward is to embrace and adopt the novel technology, while implementing guardrails to prevent its abuse. The main contribution of the paper is to review the existing literature connected to the impact of Artificial intelligence (AI) on educational creativity in this post-COVID-19 era.

Impact of Artificial Intelligence on Educational Creativity

The term Artificial intelligence known as AI appeared for the first time in 1956 at a small conference at Dartmouth College, New Hampshire. Since then, lots of disciplines in many fields such as computer sciences or even philosophy are still arguing about what an AI is. An AI is a

computer program or a robot that can learn and improve to solve problems as usually done by humans or an intelligent subject. AI is "a branch of computer science dealing with the simulation of intelligent behavior in computer.AI is also the capability of a machine to imitate intelligent human behavior. AI is a computer system able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages (Redmond, 2011).

In the book Introducing Artificial Intelligence: A Graphic Guide by Henry Brighton, he divided AI into 2 forms: they are, Strong AI and Weak A1. There is nothing much to talk about Strong AI, also called Artificial General Intelligence (AGI). AGI is a form of intelligent machine that can perform completely all kinds of tasks as a normal human. Sciences just had a feeling that AGI would appear, but no one can say for sure what, when, or how it will happen. On the other hand, they are linked to weak AI. It is a weaker form of AI in comparison with AGI which can solve some specific problems or perform specific tasks as a normal human.

John McCarthy initially coined the term AI in 1956 when he invited a bunch of researchers from a variety of disciplines as well as language simulation, vegetative cell nets, quality theory, and a lot of to a summer workshop known as the Dartmouth Summer Research on AI to debate what would ultimately become the sphere of AI (Kaplan and Haenlein, 2019). At that point, the invited scholars to McCarthy's conference in 1956 clarified and developed the ideas around "thinking machines" that up to the present moment had been quite divergent. McCarthy allegedly picked the name AI for its neutrality; to avoid highlighting one in every of the tracks being pursued at the time for the sphere of "thinking machines" that enclosed information processing, automata theory, and sophisticated information processing (Pettersson, 2018). The proposal for the conference aforementioned, "The study was to proceed on the idea of the conjecture that each side of learning or the other feature of intelligence will, in essence, be thus exactly represented that a machine will be created to simulate it."

Nowadays, fashionable lexicon definitions specialize in AI being a sub-field of applied science and the way machines will imitate human intelligence (being human-like instead of changing into a human). *English Oxford Living Dictionary* offers this definition, "The theory and development of laptop systems ready to perform tasks ordinarily requiring human intelligence, like beholding, speech recognition, decision-making, and translation between languages."
Merriam-Webster defines it this way:

1. A branch of applied science coping with the simulation of intelligent behavior in computers.
2. The capability of a machine to imitate intelligent human behavior.

Definitions of AI begin to shift based mostly upon the goals that try to be achieved with associated AI systems. Generally, folks invest in AI development for one in every of these three objectives:

- Build systems that assume precisely like humans do (Strong AI)
- Simply get systems to figure while not determining how human reasoning works (Weak AI)
- Use human reasoning as a model however not essentially the top goal (Pettersson, 2018).

It turns out that the majority of the AI development happening nowadays by trade leaders falls below the third objective and uses human reasoning as a guide to supply higher services or produce better merchandise rather than attempting to attain an ideal reproduction of the human mind.
Amazon builds a great deal of its business on machine-learning systems (as a set of AI) and defines AI as "the field of engineering science dedicated to finding psychological feature issues usually related to human intelligence, like learning, downside finding, and pattern recognition (Pettersson, 2018)."

Education Dilemma in the Post-Pandemic Era

One main effect of the pandemic on learning is the greater adoption of digital education, hybrid, and virtual classes, as well as open (and distance) learning systems of education, became popular. During the

pandemic, education had to be carried out totally through the online method, consequently compelling everyone to adopt it as a mode of learning. This adoption is predominantly vital to all open universities around the globe (Adilakshmi, et al., 2021). Large organizations have been exploring knowledge management infrastructure as part of their exertion in transformation as educational institutions. Even smaller firms have websites that offer fundamental information in their field of industry as a marketing technique. The epidemic has aided in accelerating the advancement and development in this field. Nowadays job-related expertise development through online courses (short courses, massive open online courses, open educational resources (OERs) have become a big share of work life. Lifelong scholarship has become a philosophy in today's culture. The participation of respectable industry actors in the provision of online courses through platforms such as Coursera together with university online courses merely shows that the learning services are no longer in the purview of few, but people can select how they want to create their own knowledge bank (Silva, 2018).

The question is if such wide opportunity is available for all people, therefore, the need to explore the digital divide and how it be closed. Information divide refers to the space that exists between those who have access to information and communications technology (ICT) and those who do not and those who have restricted access. Resources required range from ICT hardware and software, internet access, stable internet connection, and even a steady power supply. Gaps also have been discovered to exist among diverse generations and diverse genders. The information divide must be recognized as one of the world's most significant concerns because it increases inequity among people. The most important concern arising from the information divide is access to learning. Another critical concern is the enormous restriction on access to jobs. Much of nowadays' work necessitates digital expertise and better opportunities exist in the sphere of the information world (Trendov, et al., 2019).

Mental well-being triggered by social segregation, principally during the pandemic is another concern that is being explored comprehensively in

the post-pandemic era. Additionally, there are novel crimes caused by the digital world by producing a novel form of a susceptible group of individuals (those who are marginalized by the information divide). Information divide also transforms into other forms of divides such as classes of economies, as well as consequently social.

AI's Impact on Education and Teaching Process

Dealing with the impact of AI on the educational and teaching process, it is evident that AI will impact the educational and teaching process in many ways and primarily in two focal areas: enrollment and curriculum (Taneri, 2020). For example, Ma and Siau (2018) summed that AI will speed consistency and accuracy in curriculum and registration. Moreover, according to Ma and Siau (2018), human sciences and liberal arts majors will become more popular because these fields of learning are less susceptible to the area of AI than other fields, like accounting and finance (Ma & Siau, 2018).

Even though this study is vital for a load of data on the impact of AI on the educational and teaching process, it can be criticized for not confronting the concern sincerely, as the influence is much more intense. Certainly, concentrating on the educational and teaching process, no one would doubt that AI is substituting the lecturer or teacher in many ways, like blended education and e-learning.

The existence of an e-learning lecturer is restricted as the student interrelates with a virtual classroom, whether on Blackboard, Moodle, Turnitin, or any other platform (Jlu & Laurie A, 2018). Correspondingly, Professor Roland T Chin from Hong Kong Baptist University (2018) believes that AI is meant to revolutionize how we learn, teach, work, live, make decisions, and be ready for the AI age. Consequently, AI is not only about its superficial effect but also about radical changes in the teaching and learning process in depth (Chin, 2018).

What highlights this idea conditionally is the dispute from Princeton's Head of Computer Science, Jennifer Rexford. She surmises that AI is efficient in learning and teaching if others learn: "Learning how people learn will hopefully help us and others think more generally about

retraining down the road" (Rexford, 2018). Therefore, according to Rexford, the proficiency of AI is provisional, as understanding learning styles is the only basis for success. Alike, Jabar and Yousif (2011) argue that the education process in this world is becoming more interactive and engaging, according to recent scholars, because e-learning provides the learner with artistic and pedagogical features as well as integrates and deals with innumerable kinds of content which react efficiently to the scholars' needs (Jabar and Yousif, 2011).

The absence of striking instances of how AI impacts the student's everyday life can be a restriction of the method of Jabar and Yousif, highlighted below in the Education and Unit Study. For instance, AI provides deep education and teaching procedures to get higher performance from both the tutor and the tutee. For instance, adopting hypermedia for a writing class facilitates mistakes and cuts time consumption. For instance, before discovering AI, it took ages for a teacher to assess and grade papers and check for plagiarism. Thanks to AI, checking for academic integrity and language issues takes minutes or less. Indeed, using artificial intelligence, a lecturer submits the work to Turnitin, Grammarly, or other software. In minimal time, it can provide constructive feedback based on the results generated by the software used.

Even though Artificial Intelligence is flawless in covering language and educational integrity matters, semantic, pragmatic, and cognitive levels, in many instances, need the involvement of the human mind to perform the last touch (Mellul, 2018). Nonetheless, Artificial Intelligence offers several students connections about the topic's prerequisite for the subject matter and eases and inspires both students and teachers by tackling different learning styles such as autonomous learning, visual learning, e-learning, audio-visual learning, and deep learning. Correspondingly, Artificial Intelligence enables the tutor to select and apply the learning method taxonomy that the learner needs and highlights the areas of improvement to be focused on (Jabar and Yousif, 2011).

In the meantime, Artificial Intelligence reinforces independent learning as the learner becomes autonomous and free to access input anytime and anywhere. Finally, according to Richer (1985), Artificial Intelligence positively impacts learning by offering intelligent computer-assisted instruction that facilitates educational intuition and provides expert systems to diagnose and assess learning results (Richer, 1985). It is undeniably clear that Artificial Intelligence adds a lot to the learning and teaching process, so what about assessments and grading?

Impact of AI on the Assessment and Classification Process

Artificial Intelligence does not impact only the education and teaching process but also the assessing and grading process. For example, Artificial Intelligence checks assignments and research projects through software such as Turnitin against billions of resources in no time. Therefore, similarities are easily generated to judge whether the learner plagiarised. Similarly, online rubrics and grading forms are added to assignments with criteria and scales, and final grades are automatically added to the submitted work without any hassle (Mahana, et al., 2012). Additionally, Artificial Intelligence provides interactive ways of providing constructive feedback to the student, easy access in a relaxed manner anytime and anywhere, with more privacy and autonomy.

Furthermore, the instructor can write or record feedback to facilitate and improve learning from errors. Also, in reference to a study by Stanford University, AI is applied to evaluate scholars' reactions and create a computer model that endorses rules inferred from the tutor's grading decisions. What is specific about AI is that it develops learning instead of making a final authoritative decision. Additionally, it reflects more transparency, trust, and quality control (Stanford University, 2019). In the same vein, Tovia Smith, in her article "More states opting to Robo-Grade' Student Essays by computer," argues that rob-graders (robots used for grading students' papers) are increasingly used to grade students' essays mainly in Utah, Ohio and soon Massachusetts to follow (Brad Rose Consulting, 2019).

Correspondingly, a research professor at Colorado University named Peter Foltz says they have Artificial Intelligence techniques that can judge up to 100 features and that grading essays are highly accurate (Brad Rose Consulting, 2019). In short, artificial intelligence is playing a more prominent role in the evaluation and classification of higher education in the United States of America.

Although the above researches are valuable from diverse standpoints in tackling the role of Artificial Intelligence in grading and assessing the learner and facilitating the role of the teacher, a critical thinker would not fail to pose the following questions: What about bias in marking reports? Who would guarantee that AI is fair and objective? What about the human side of the learning process and assessment? Will AI consider the psychology of learner grading or assessing a paper?

AI Impact on Future Careers of Graduates

Artificial Intelligence impacts the world of education, but it also seems restricted to this field and follows the student even after graduation. For instance, according to Wang and Siau (2017), Artificial Intelligence will influence the future job market of required skill sets. It will replace many other kinds of research that involve routine tasks and structures that are easy to automate instead of unstructured disciplines that require complex cognitive interference (Wang & Siau, 2017). Artificial Intelligence or computer assessment is not restricted to grading papers but can be the gateway to a future career. For instance, a human may not read CVs but be screened by an algorithm specialized in candidate shortlisting. For instance, in an article by the Economist entitled "How algorithms may decide your career: getting a job means getting past the computer", it is reported that the largest firms are now using computer programs or algorithms to choose candidates with an applicant tracking system (ATS) which can reject up to 75% of candidates. The above policy pushed applicants to use keywords to maximise screening interests (Brad Rose Consulting, 2019).

Vodafone and Intel are not satisfied with shortlisting CVs but instead use a computer-driven visual interviews service called "HireVue" to further

select candidates. In this process, Artificial Intelligence analyses facial expressions and language patterns and decides to pass or fail the applicant (Brad Rose Consulting, 2019). According to research by Frey & Osborne (2013), the number of jobs at risk that will be computerized and comprise advances in robotics and machine learning is roughly 47% of US total employment (Frey & Osborne, 2013). Similarly, Dizikes (2020) refers to research conducted by Daron Acemoglu and Pascual Resrego from MIT University that each added robot replaces 5.6 workers, almost equal to six people (Dizikes, 2020).

Correspondingly, same study executed by Ma & Siau (2018) of Oxford University argues that within the next 20 years, around 47% of jobs in the United States of America and virtually 54% in Europe will be at risk due to Artificial Intelligence (Ma & Siau, 2018). Furthermore, the latter scholars at Oxford University forecast that Artificial Intelligence will write high-school essays by 2026, write best-selling books by 2049, translate languages by 2024, and perform surgeries by 2053. Chin (2018) from Hong Kong University argues that there are overlooked Artificial Intelligence instances or less obvious ones such as translation machines that enable you to speak to anyone with any language instantaneously. Chin (2018) added that JPMorgan Chase and Co. use a learning machine that deals with loan agreement processes and saves 360,000 hours of work by accountants and lawyers (Chin, 2018).

Even though all the values stated above about how Artificial Intelligence is creeping into the career world, Ma and Siau (2018) criticize these features disputing that when it comes to soft skills such as empathy, communication, collaboration, innovation, critical thinking, problem-solving, and leadership, Artificial Intelligence is not as robust as human cognitive ability (Ma & Siau, 2018). Both scholars reinforce their opinions by suggesting that higher institutions should provide soft and hard skills such as maths, IT, and engineering while training students. They think Artificial Intelligence may not be capable of affording these skills for future business careers (Ma & Siau, 2018).

Even though computer-driven screening is believed to avoid biases in the traditional employment process, Artificial Intelligence is not bias-free.

That algorithm can favour candidates with time and money to continually re-tool their resumes (Brad Rose Consulting, 2019).

To end the conflict with a concluding result, Chin (2018) disputes that citizens of the novel world order need new skills. These skills should include interpersonal skills such as adaptability, critical thinking, conflict resolution capabilities, and other cognitive skills.

Steve Jobs thinks, 'It is technology married with the liberal arts, married with the humanities that yields us the results that make our hearts sing' (Henn et al., 2005). How would higher education impact AI? Undoubtedly, the world is getting more innovative, and AI has rehabilitated our world by putting natural languages and data by enabling Siri, Netflix, Facebook, Google, Alexa, Amazon, and many other platforms as part of our daily lives (Oblinger, 2018). However, the question arises: How will higher education affect AI? This research paper will address these issues from the two focal points of ethics and cognition as answers to these concerns.

Theoretical Review

Disruptive Innovation Theory

The axiom "disruptive innovation," first used by Clayton Christensen in 1997, denotes how novel forms of technology or business models might displace obsolete ones. To succeed in the present extremely competitive business atmosphere and keep up with the rapid pace of technological improvement, disruptive innovation is more crucial than ever.

Because of digital transformation, companies may now offer cutting-edge goods and services, streamline internal processes, and forge deeper bonds with their clientele than ever before. This has resulted in the development of novel business models and the upheaval of established markets (Katz & Green, 2018). For example, Uber disrupted the taxi industry by using digital technology to create a new model of transportation service that was faster, more convenient, and cheaper than traditional taxis. Similarly, Airbnb disrupted the hotel industry by using digital technology to connect travelers with local hosts and provide a more personalized and affordable lodging experience.

Disruptive innovation theory explains how these new entrants were able to disrupt established industries. According to Christensen (1997), disruptive innovations typically start as low-end or niche offerings that are initially dismissed by established players as inferior or irrelevant. However, as these new offerings improve and gain market share, they begin to encroach on the established players' market, eventually displacing them. AI technology has enabled these new entrants to rapidly improve their offerings and gain market share, leading to the disruption of established players (Christensen et al, 2015).

Implications of Artificial Intelligence in Educational Creativity

The increasing adoption of Artificial Intelligence technology for various applications in the education sector and the growing need for multilingual translators integrated with Artificial Intelligence technology is expected to drive the growth of the AI in education market. AI is no longer just contained in science fiction films. It is going to be part of our everyday lives and in our classrooms. As we use tools like Siri and Amazon's Alexa, we are just beginning to see the possibilities of AI in education. A few more impacts are listed below:

1. Administrative Tasks Automation
2. Smart Content
3. Smart Tutors and Personalization
4. Virtual Lectures and Learning Environment
5. Teachers' Support
6. Students' Communication
7. Catering to the Needs of Variety of Students
8. Allow Teachers to Act as Learning Motivators
9. Provide Personalized Help
10. Dynamic Scheduling and Predictive Analysis (Subrahmanyam1 & K. Swathi, 2018).

Case Studies of AI in Educational Creativity

Artificial Intelligence's digital and dynamic nature offers opportunities for student engagement that cannot be found in often outdated textbooks or the fixed environment of the typical four-walled classrooms.

Some case studies have been provided in which AI is being pioneered and applied in education. Some of the applications are still in a relatively primitive stage in terms of envisioned long-term objectives. Out of those provided, intelligent tutoring systems (ITS) seem to have made the most progress over the last 20 years, as one of the original concepts for applications of AI in education. All have the potential to help shape the next generation of more personalized learning and responsive teaching. (Subrahmanyam1 & K. Swathi, 2018).

I. Smart Content

Smart content creation, from digitized guides of textbooks to customizable learning digital interfaces, is being introduced at all levels, from elementary to post-secondary to corporate environments. Content Technologies Inc., an AI development company specializing in the automation of business processes and intelligent instruction design, has created a suite of smart content services for secondary education and beyond. Cram101 uses AI to help disseminate and break down textbook content into digestible smart study guides that include chapter summaries, true-false and multiple-choice practice tests, and flashcards. JustTheFacts101 has a similar, though more streamlined purpose like highlighting and creating text and chapter-specific summaries, which are then archived into a digital collection and made available on Amazon. Other companies are creating smart digital content platforms, complete with content delivery, practice exercises, and real-time feedback and assessment. Netex Learning, allows educators to design digital curriculum and content across devices, integrating rich media like video and audio, as well as self- or online-instructor assessment. It also provides a personalized learning cloud platform designed for the modern workplace, in which employers can design customizable

learning systems with apps, gamification, and simulations, virtual courses, self-assessments, video conferencing, etc. Learning platforms for the modern workplace are designed to allow employees to master additional skills and receive continuous and automated feedback, and when used strategically have the potential to help improve performance and increase production. (Subrahmanyam1 & K. Swathi, 2018).

II. Intelligent Tutoring Systems

Intelligent tutoring systems (ITS) have made much progress since their early counterparts. Carnegie Learning's Mika Software uses cognitive science and AI technologies to provide personalized tutoring and real-time feedback for post-secondary education students, particularly incoming college freshman who would otherwise need remedial courses. Carnegie states the cost of such remedial learning as costing colleges $6.7 billion annually, with only a 33% success rate for math courses. ITS provides the potential for students to more conveniently access flexible and more personalized modes of learning on an ongoing basis.

Pearson, in collaboration with University College London Knowledge Lab, notes that today's model-based adaptive systems are also increasingly transparent, allowing educators to understand how a system arrived at a next-step decision and rendering them more effective tools for classroom teaching. The iTalk2Learn, a system engineered and tested by Carnegie Mellon University to assess its effects on young students learning fractions, applied a learner model that explicitly included information about an individual's mathematics knowledge, cognitive needs, emotional state, as well as feedback received and the students' responses in turn. (Subrahmanyam1 & K. Swathi, 2018).

III. Virtual Facilitators and Learning Environments

While it seems obvious that no one in education is eager for virtual humans to come and replace educators, the idea of creating virtual human guides and facilitators for use in a variety of educational and therapeutic environments is a promising area of development. Though not yet a reality, the ultimate goal in this field is to create virtual human-

like characters who can think, act, react, and interact naturally, responding to and using both verbal and nonverbal communication.

The University of Southern California Institute for Creative Technologies is a pioneer in creating smart virtual environments and applications that draw on AI, 3-D gaming, and computer animation to develop authentic virtual characters and realistic social interactions. USC researchers have some ongoing projects in the space that hint at applications to come over the next two decades.

Captivating Virtual Instruction for Training (CVIT) is a distributed learning strategy that aims to integrate live classroom methods with best-fit virtual technologies—including virtual facilitators, augmented reality, intelligent tutors, and others—in remote learning and training programs. As AI advances in this education domain, it seems there is more evidence to support the idea that both intelligent systems and humans are needed to manage different aspects of students' academic and social competencies. AI will likely not replace but will serve as an invaluable extension of the human expert, helping teachers to more effectively meet the diverse needs of many students simultaneously.

From facial recognition in the classroom to computers marking essays, China is wholeheartedly deploying new technologies into its education system. A recent report has revealed a high school in Eastern China is testing a new facial recognition system designed to analyze the engagement of students in a classroom, in real time.

An Intelligent classroom behavior management system scans the room every 30 seconds logging both the behavior of the students and their facial expressions. The system can identify seven moods, including happy, sad, afraid, and angry, by simply analyzing a student's face. A camera, perched atop the blackboard at the front of the classroom, also tracks six types of behavior: reading, writing, hand raising, standing up, listening to the teacher, and leaning on the desk.

In an even more striking and widespread implementation of Artificial Intelligence into the education system, a recent report from the South China Morning Post (SCMP) claimed one in four Chinese schools were experimenting with computer software to grade essays. The machine-

learning software has allegedly been in development for nearly a decade using deep learning algorithms to constantly learn and improve its ability to understand and evaluate a student's work. It is currently estimated that 60,000 schools are testing the technology and it can reportedly offer the same grade as a human marker up to 92 percent of the time (Subrahmanyam1 & K. Swathi, 2018).

Automated marking systems are not an entirely new idea. While computer-assisted marking software has been around for almost as long as computers, it has only been in the last decade or two that computers have begun to be used for marking more abstract student work, such as argumentative essay writing. In China, these systems are implemented with degrees of scale that are unprecedented anywhere else in the world. China is currently training its neural network grading system in a central server that compiles the work of millions of students. As well as promising a potential way to take out the variations attributed to human subjectivity in marking, this system undoubtedly offers the central government a remarkable ability to track the progress of all students in the country, in real time.

And this frighteningly comprehensive monitoring of its education system could inevitably be synced up with the country's oncoming social credit system due for full activation by 2020. This proposed system will assign each citizen a social credit score that will determine a person's ability to travel overseas, get a home loan, or even access the internet.

Issues and Challenges of AI in Educational Creativity

As we all know, there are pros and cons associated with every technology — and AI is no exception to this rule. The following are some of the issues and challenges:

1. The AI project development environment is quite different. Most of the time, development is about identifying data sources and then gathering content, cleansing it, and curating it. Such an approach requires different skills and mindsets, as well as different methodologies. In addition, AI-powered intellectual systems have to be trained in a particular domain.

2. The slow digitization rate is affecting the adoption of AI technology in emerging economies, as the deployment of AI-enabled solutions requires IT infrastructures to generate accurate results. This factor may restrain the growth of the AI in education market.
3. To train machine learning algorithms one needs massive and clean data sets, with minimum biases.
4. One needs also to keep in mind data privacy issues when it comes to harvesting personal data, particularly in light of the General Data Protection Regulation that is coming into effect in 2018.
5. By 2018, Gartner predicts that 20% of all business content will be produced by machines. While there is evidence that AI is capable of creating certain kinds of content that is virtually indistinguishable from human content in terms of clarity and accuracy, machine-produced content is substantially more boring and less pleasant to read according to one study.
6. It's easy – and fun – to envision a complex collection of AI-driven components collaborating to create fully automated, perfectly personalized customer experiences. But that system will be prone to frequent failures as one or another component finds itself facing conditions it wasn't trained to handle.
7. When combining the cost of installation, maintenance, and repair, it's clear that AI is expensive. Only well-funded schools will find themselves in a position to benefit from AI.

Conclusion

Artificial intelligence is the most intriguing of technological advancements of our time. From creating advanced data-collecting algorithms to providing detailed and customized student feedback, AI shines as the most competent AI that can quickly interpret a student's needs and design an appropriate assessment. It can show students mastery, repeat lessons as needed, and quickly design a personalized learning plan for each student. AI could provide teachers with a virtual

teaching assistant. But more than just teachers and students, it can be a way to support parents by involving them in the learning environment of students and providing them with the information they need to help their students be successful when they're not in the classroom. The future likely holds a lot of possibilities for AI. This paper highlighted the Potential impacts of AI on educational creativity, some worldwide case studies, issues, and challenges associated.

Recommendations

1. The paper recommends a structuring of Artificial Intelligence research and creating policies to support AI in the future.
2. Educational institutions should adopt some of the best practices of some of the world's most advanced nations and regions that have encouraged the use of AI in higher education, which enhances students' learning opportunities, and boosts student engagement.
3. There should be more focus on implementing educational software using AI techniques like Data mining techniques and machine learning approaches as in other nations.
4. Policymakers, business captains, and individuals must leverage the opportunity that arises from the usage of Artificial Intelligence to fully harness the potential of digital transformation and sustainable development of the educational sector in Nigeria.

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