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Prospects Of Using Artificial Intelligence In Teaching And Learning In Educational Institutions In Nigeria

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ABSTRACT
One phenomenal and epistemological breakthrough in the 21st century that is a systematic integration of many disciplines – computer science, engineering, educational technology, science, technology, information and computer technology, which has turned out to be a phenomenal asset to humanity is artificial intelligence. Artificial intelligence has multifaceted areas in which it can be used and one area where its use is most impactful for the development of man and his society is teaching and learning. Using the philosophical methodology, this study discusses the prospects of using artificial intelligence in teaching and learning. The study establishes that instrumentally and functionally, artificial intelligence promotes individualized instruction, increases access to education, enhances administrative efficiency and productivity, provides teachers and learners with quick answers to issues and challenges in education as well as triggers knowledge explosion and the conducting of quality researches among other benefits. The study makes recommendations, part of which is that states should invest in artificial intelligence infrastructure to ensure that everyone has access to it, stakeholders in teacher education should make the acquisition of knowledge of artificial intelligence a topmost priority and there should be a liberal attitude towards artificial intelligence and knowledge of it among other recommendations.
Keywords: Artificial intelligence, teaching and learning, prospects, educational institutions, Nigeria.

INTRODUCTION

Without exception, the 21st century is associated with phenomenal and monumental breakthroughs and the breaking of many epistemological frontiers across many disciplines and many areas of human endeavours and these breakthroughs and breaking of many epistemological frontiers have given rise to changes that have potentials to empower and engineer revolutions in man and his institutions to have unhindered and unlimited access to areas and environments which prior to this time had remained unimaginable, unthinkable and impossible. Having unhindered and unlimited access in the contemporary times to areas and environments which in the past seemed unimaginable, unthinkable and impossible may be pointing in directions that suggest possible improvement or addition of value in the quality of life of man and the sustainable flourishing and survival of his institutions.

There is hardly any area of human endeavour that these breakthroughs have not touched. Capability of man to develop capacity for space exploration has enhanced and brought about radical and revolutionary transformations in the communication and entertainment industries, in the same way as the trends in the breakthroughs have widened the leisure and recreational space for man through man's exploration of oceans and the various water bodies that occupy about 70% of the earth. It is a fact that cannot be refuted that the economy of man has improved ever since man developed innovations for exploring and exploiting mineral resources in environments and areas that were seen and described as bizarre and such breakthroughs and breaking of epistemological frontiers can add to man's effective use of his skills of creative and critical thinking. The development of skills that are supportive of creative and critical thinking are necessary conditions for laying foundations for vibrant and robust developments in the field of education, which is the bedrock and capstone for superlative human capacity building upon which the sustainable development of states and continuous human flourishing depend.

Without any iota of doubt, the unfolding breakthroughs in the 21st century are major and remarkable pluses in man's quest and curiosity to tap the abundance of nature and natural resources for his survival and advancement. The various monumental and phenomenal breakthroughs that have become norms in the 21st century owe their roots to systematic and integrated innovations in technology and advancements in technology. Many technological innovations and technological advancements have been developed in the 21st century but there is one in the history of creation that has potentials to creatively and critically revolutionalize all areas of life of man as well as offer immense opportunities through which actions and activities of man can be handled with so much ease and comfort so much, that, efficiency and productivity can be enhanced and maximum human happiness can be guaranteed. This technological innovation that guarantees efficiency, greater productivity as well maximum human happiness is artificial intelligence.

Artificial intelligence is a 21st century technological innovation which scholars describe in different ways. According to Akinwalere & Inanov (2022), it is a technological innovation that is committed to making the lives of humans a lot easier while Bostrum (2017) writes that artificial intelligence is a booming technological domain that has the capacity to alter every of man's social interactions. What these reveal is that artificial intelligence is a phenomenal asset to humanity as every area of human endeavour stands to benefit from its multi-level and multidimensional potentials. However, be this as it may, the education industry, precisely teaching and learning is one relational and interactive human social practice and institutions that stands to gain more from the technological breakthrough and innovations laden revolution that artificial intelligence is associated with.

Globally, scholars and institutions acknowledge and say in unison that the education industry, precisely teaching and learning are vibrant and receptive destinations or routes through which the multi-level and multi-dimensional potentials that are associated with artificial intelligence can make quicker and accelerated transformative in-roads in the affairs of man, institutions of the state and humanity generally. What scholars and institutions implicate here is that artificial intelligence is of fundamental importance in education, precisely teaching and learning as its adoption and effective use has the capability and capacity to revolutionalize and skyrocket productivity through stimulating higher achievements in teachers and learners.

It is along these lens and lines of thinking that Akinwalere and Inanov (2022:) write that artificial intelligence promises important benefits for education, such as personalized learning according to the preferences of each student, helping them to learn at their own pace and control iterations to improve their mastery of any preferred or chosen topic. What had been said above is recapped and reemphasized by Wang and Chew (2024:676) when they write that artificial intelligence has inherent abilities to rejig, revolutionalize and rechart new roadmaps for

> learning methodologies by introducing new paradigms in how information is delivered and processed. These dialogue-based systems not only optimize teaching efficiency and quality but also serve as catalysts for learner creativity and engagement, offering personalized learning experiences that adapt to individual needs.

The above expositions are saddled with many revelations and at the centre of such revelations is the indisputable fact that artificial intelligence is associated with many prospects especially in the

education industry. Specifically in this paper, focus shall be on detailed presentations of the prospects of artificial intelligence in teaching and learning in educational institutions in Nigeria.

A study that focused on the prospects of using artificial intelligence in teaching and learning in educational institutions in Nigeria can be justified on many fronts. Innovations especially in education are the capstones for effectiveness, efficiency, greater service delivery and productivity and correspondingly people need to be sensitized to embrace them. Specifically, this study can help to sensitize the masses on the appropriate actions and responses individuals and institutions can make or take so that change, which occurs in split seconds especially in the education industry can manifestly and latently become norms in the education industry in particular and the society at large. Through this study the creation of the right awareness, sensitization and the promotion of the right behaviours to education which bristles with constant and continuous innovations can be canvassed and promoted among all stakeholders and where this is rightly and honestly done, what may result can be supportive and receptive paradigm shifts where all who identify with education can align with the change mantra and positive reforms and transformations that are synonymous with the education industry. Most importantly this study can be justified on the premise that robust awareness and sensitization is needed on the subject matter of prospects of using artificial intelligence in teaching and learning as artificial intelligence in its entirety is technology-driven, a development that points in the direction that its use and adoption in the education industry calls for inclusive and comprehensive paradigm shifts that can prioritize laying foundations for new beginnings namely effective use of technology in teaching and learning, need for new funding formula so that the right infrastructure can be available for optimum service delivery in educational institutions, new orientation, new investment decisions in education, new instructional and pedagogical strategies especially in teacher education with emphasis on sensitizing its stakeholders to existentially and pragmatically reposition in readiness for responding to the realities of artificial intelligence in the 21st century.

The theoretical framework upon which the study is based is social constructionism which is also called social constructionism. Scholars credit Lev Vygotsky to be the founding father of social constructivism and associate the theory with qualitative research paradigm. The crux of social constructivism as a qualitative theory of knowledge revolves around the thesis that knowledge and ideas are social phenomena and are socially constructed through interactions between the teacher, the learners and the environment (Nwaokugha & Keri-Frank, 2023:84). The position above is well highlighted by Nwaokugha & Agbarakwe (2024:252) when they write that:

> Social constructivism invokes a meaning that revolves around the fact that human beings are the principal actors and agents that produce, generate meaning, build and construct knowledge, developments that suggest that no knowledge is ready made or manufactured anywhere, rather that knowledge grows and develops out of human consciousness through interactions, dialogues, manipulations and communication that systematically and logically derive from the day to day experiences of persons with other institutions in the society.

Anyone who creatively and critically examines the above expositions on social constructivism can come to the conclusion that knowledge construction from the axiological and epistemological lens of social constructivism is a product of collaboration among individual stakeholders in the knowledge industry where those who show interests, curiosity and quest for knowledge construction and development identify themselves with what Akpan, Igwe, Mpamah & Okoro (2020:50) call "interaction, discussion and knowledge sharing". What seems to be the modus operandi of social constructivism is provided by Nwaokugha & Abiakwu (2024:167), when they write that in social constructivism, he who shows interests in knowledge construction must be actively,

> engaged and committed to breaking new frontiers of knowledge, is committed to solving problems and responding to the demand of change, is desirous of collaboration with others as well as exploring and exhibiting the highest forms of creative and critical thinking.

Social constructivism as a theory of knowledge construction is appropriate for this study because of its focus on innovations in education, precisely teaching and learning, which are cornerstones for

critical and creative thinking abilities and consequently springboards for problem solving and individual and national development of states. As the education industry is committed to human capacity building and human capacity development of states, any study that focuses on a theory that prioritizes the development of innovations for teaching and learning especially the development of critical and creative thinking can be a destination of choice for any meaningful investigation.

The study used the philosophical research methodology which is also called the qualitative research methodology and is marked specifically by many outstanding features. According to Angadi (2019:37), a philosophical or qualitative research methodology receptively and robustly aligns itself with the collection of extensive narrative data on many variables over an extended period in a naturalistic setting to gain insights not possible using other types of research methods. Part of what makes the philosophical research methodology unique is that the researcher is "the primary instrument for data collection and analysis, and it is primarily interested in meaning-how people make sense of their lives, experiences and their structures of the world". (Angadi, 2019:37).

To this end, philosophical research methodology is deep rooted in critical and analytic reflections, logical orderliness, semantic clarity, rigour of thoughts with the objective of arriving at sound prescriptions that target resolving issues that are the focus of the philosophical exercise. The above may account for why Ishiatiaq & Naz (2024:10) write that:

> Qualitative (philosophical) research is often exploratory aiming to uncover new insights, perspective and understanding within the educational setting. Qualitative research in education involves collecting and analyzing non-numeral data such as interviews, observations, case studies and document analysis. The aim is to generate in-depth insights, explore meaning and understand the underlying processes that shape educational phenomena.

All the above features that are associated with philosophical (qualitative) research methodology may be summed up in the observation made by Nwaokugha & Danladi (2016) and Nwaokugha & Wogonwu (2023) when they write that a methodology in an academic discourse is said to be philosophical (qualitative) when the researcher resorts to speculation, analysis and prescription.

Speculation as a method of philosophical research has been at the centre of knowledge construction and knowledge development from antiquity and has remained relevant in the present time and will continue to be relevant in the future. Its long history in knowledge construction and knowledge development may account for why different scholars who have roots in different academic disciplines have one thing or the other to said about it. According to Haung, Xie & Chen (2021:1), speculation or speculative thinking refers to thinking about past and future possibilities, which includes counterfactual thinking, pre-factual and other types of thinking and in defining speculation and speculative thinking from another perspective, Oduor (2010:97) writes that speculation or speculative thinking invokes a meaning that revolves around "to wonder, conjecture, guess or to hypothesize". According to Aminigo (1999) and Agulanna (2011), speculation or speculative thinking is an attempt to find logical coherence in an entire realm of thought. A common denominator which all the positions above share in common and which is the central idea of speculation and speculative thinking is that the soundness, authenticity, reasonability, reasonableness and acceptability of a proposition depends on how the proposition aligns with facts and correspondingly the truth of any proposition or presentation lies in the extent in which its conclusions derive from the premises before them or what Nwaokugha & Danladi (2016:421) call the rootedness of a proposition "in the science of logic or the various orderly sequences that lead to a conclusion". In short Nwaokugha & Keri-Frank (2023:39) say it all when they write that the modus operandi of speculation or speculative thinking is

> One in which any scholar who is favourably disposed to using it builds up ideas and carefully, sequentially, systematically and logically show how one idea is logically and systematically related to the other ideas in the whole system of ideas.

What this implicates is that speculation or speculative thinking makes a case that aligns with what Nwaokugha & Wogonwu (2023:4) call "a sense of logical unity, logical coherence and logical clarity about a presentation that is the subject matter of a philosophical discourse". Speculation or speculative thinking can remain the heartbeat of philosophical research for many reasons. Speculation or

speculative thinking is associated with guiding and improving actions and performances of man and his institutions in their day to day experiences and Taggart (2012) says it all when he writes that speculation or speculative thinking provides man and his institutions with higher order thinking consolation, which is a type of philosophy of action that may be committed to igniting, sensitizing, conscientizing, influencing and shaping people's philosophy of life hence it has the potentials to serve as a provocateur or thought provoking lens or mechanism in people. What the above reveals is that speculation or speculative thinking is a trigger for engineering robust creative insights, critical and creative ideological revolutions whose objective is the laying of foundations for new possibilities in the form of rethinking and reexamining what man and his institutions have always done in the past and how man and his institution can do them better in the future in the light of new and contemporary realities. This accounts for why Gare (2020) writes that speculation makes it possible to transform ourselves, creating radically new ways of living and new forms of life.

Speculation as a philosophical research method can continue to be in vogue due to its rootedness in satisfying man's natural curiosity to know or obtain knowledge especially on those realities that continuously influence and make waves in man's efforts to understand himself and the universe but such efforts lack a one size fits all interpretation, explanation and understanding. Those phenomena that exert continuous influence on man but lack consensus interpretation and understanding become springboard and flashpoints upon which speculation and speculative thinking flourishes, lending weight to the age long saying that man speculates in order to know more. It is an irrefutable fact that the more people speculate on a particular subject matter, the more meanings they generate about that subject matter and this is where Swerdberg (2021) can be said to be one hundred percent correct as he writes that people speculate when faced with realities that are ultimately unknown.

In human history, metaphysical and axiological topics are best handled using speculation and speculative thinking and why this is so is that topics and concepts under their brackets or that are discussed under them cannot be fixed or cannot have permanent ready-made answers hence people's positions on them must continue to change, with practitioners in such areas of knowledge aligning themselves with the rhythms of change about such topics and concepts at any particular point in time.

Analysis as a method of carrying out philosophical research focuses exclusively on meanings that may be associated with words, terms, concepts and propositions. The preoccupation of analysis on revealing the meanings of words, terms, concepts and propositions is deep-rooted in the fact that words, terms, concepts and propositions are functional instrumental vehicles for communicating ideas as well as the foundations for the establishment of any particular meaning of a word, term, or concept in any particular context. According to Nwaokugha & Danladi (2016:421) "Any researcher who employs the method starts by breaking down his subject matter into smaller forms that constitute it and at the same time shows how all are related in attaining a specific objective". When analysis is thoroughly and appropriately done, it creates rooms for precision in the use of words, terms, concepts, propositions as well as helps to remove all traces of inconsistencies, illogical expressions, contradictions, absurdities and ambiguities in man's daily cultural, social, religious, political and economic activities involving man and his fellow man and the state. What analysis tries to promote is the removal of every trace of semantic hitch that can constitute hindrance or obstacle to effective communication and understanding.

Fundamentally, analysis prioritizes precision and functions to safeguard members of the society to guide against faulty use of words, terms and concepts as virtually all crisis and misunderstanding all over the world owe their roots to faulty use of language and faulty communication and where analysis is properly done, it brings to the barest minimum the occurrence of crisis, disagreement, conflicts and misunderstanding, suggesting and implicating that analysis is key to cooperative, peaceful and harmonious living. Analysis also plays key roles in knowledge construction and knowledge development as its inclination to precision in the presentation of facts is key to delineating epistemological boundaries and constituencies in disciplines. In fact, Nwaokugha & Nwaogu (2024:64) hint on this when they write that;

> The trending practice in scholarship all over the world is one where analysis is fast replacing other methods of research, suggesting that through analysis, more epistemological frontiers can be broken and humanity can enjoy more global peace as well as more dividends of their investments in education and research.

Analysis is of two types namely conceptual analysis and linguistic analysis. According to Nwaokugha & Abiakwu (2024:167), any analysis that is done with the intention of establishing meanings or ideas that are associated with a word, term, concept or proposition is called conceptual analysis. On the other hand, any analysis that is focused on ascertaining if the meaning that is ascribed to a sentence is actually what the sentence stands for is linguistic analysis. Language and logic play significant roles in all analysis.

Scholars focus robust attention on prescription as a method of philosophical research and this has given rise to a plethora of definitions of what it means. According to Oduor (2010:97), prescription is a conscious attempt to recommend or set down as a rule or a guide and in the same line of thinking, Nwaokugha (2021) writes that prescription invokes a meaning that revolves around deliberate and conscious efforts by a scholar or a researcher to make autonomous value statements on how an issue that has been the focus or subject matter of a philosophical discussion can be resolved so that all the wrongs noticed in the course of the discussion can be harmoniously addressed. In a nutshell, suggestions and recommendations in studies or researches fall under the frame of reference of prescription (Nwaokugha, 2021).

Every study that is worth the name must have a section that is exclusively devoted to prescription and Nwaokugha & Agbarakwe (2024:255) justify this when they write that "prescription is key in any research (study) because it is the frame or hub that contains ingredients or possible lines of actions for solving or resolving the problem(s) that are addressed in a study or research". As obvious as this can be, prescription is an article of fate for scholars whose area of specialization is axiology, particularly social philosophy, ethics, aesthetics and political philosophy and the reason for this revolves around the fluidity of values, which according to Nwoke and Nwaokugha (2024:59) "are constantly changing with time and circumstance and such scholars respond to the various situations based on the turnout of events and developments in the affairs of man and the society". To this end, Nwaokugha & Abiakwu (2024:168) are more clinical on disciplines that are more prone to using prescription when they write that those disciplines which by their nature easily change over time are more receptive to prescription.

The philosophical research methodology that is adopted for this study is appropriate and is justifiable on many grounds. Philosophical research method helps to widen and boost researchers' investigative skills and confidence levels as researchers see every academic issue as solvable, researchable and resolvable. Due to its inclination to critical reflections and rigours of thoughts, the philosophical research methodology is supportive of interdisciplinary, multidisciplinary and cross-disciplinary approaches to studies and this is beneficial to the knowledge industry as it is like a pillar for the promotion of collaboration among scholars across disciplines as well as a trigger for igniting and stimulating revolutions that can bring about the breaking of new academic frontiers in the knowledge world. That the methodology aligns with the above suggests that it is not restrictive and does not impoverish scholars and disciplines that are receptively disposed to using it.

What is usually the norm among scholars who use the philosophical research methodology is to exclusively focus on and discuss the key issues under investigation and to this we now turn.

Artificial Intelligence (AI)

The 21st century is associated with many breakthroughs and the breaking of many epistemological frontiers across many disciplines and many areas of human endeavours. Such breakthroughs stand out as they have epical and phenomenal implications as well as robust potentials to bring about positive transformations, or revolutions in the affairs of man and his institutions. One resounding breakthrough in the 21st century that has empowering and transformative potentials for man and his institutions is artificial intelligence.

Artificial intelligence is one breakthrough where there is hardly any area of human endavour that its transformative potentials has not been noticed as artificial intelligence can be used in the chain of food production, health institutions, oil and gas exploration and exploitation, transportation, education, communication as well as commercial and financial institutions. The versatility in the use of artificial intelligence has made it a focal flashpoint in the agenda of policy makers, a political priority in the political discourse and deliberations of states as well as an emerging area of scholarly attention and research especially as it has been identified by Tahir, Hassan & Shagoo (2024) as one of the drivers and trends in the 21st century.

To be expected of a transformative and revolutionary innovation and breakthrough in the pedigree of artificial intelligence can be its ability to attract scholars and a corresponding avalanche of definitions and rich reflections on its many possibilities. According to Russel & Norvig (2010), the term artificial intelligence was first mentioned in 1956 and Baker & Smith (2019) write that artificial intelligence does not refer to a single technology but is defined as "Computers (that) perform cognitive tasks usually associated with human mind particularly learning and solving problem". According to Aggarwal (2018), artificial intelligence is a general term that refers to diverse analytic methods and these methods can be classified as machine learning, neural networks and deep learning. According to Lydia, Vidhyavathi & Malathi (2023:75), artificial intelligence can be defined as automated systems that can engage in human-like processes such as learning, adapting, synthesizing, self-correction and using data for complex processing tasks while Tuomi (2018) writes that artificial intelligence is often defined as a computer system with the ability to perform tasks commonly associated with intelligent beings. In their own remark about artificial intelligence, Shi and Zheng (2006), write that artificial intelligence is perceived as a research subfield belonging to computer science whose nodal concern is the stimulation, extension and enhancement of human intelligence.

There are scholars whose attempts at discussing artificial intelligence tilt towards the utility, functionality and usefulness of artificial intelligence in the affairs of man and the society. According to Akninwalere and Ivanov (2022), artificial intelligence is a technological innovation that is committed to making the lives of human beings a lot earlier while Bostrum (2017) writes that artificial intelligence is a booming technological domain that has the capacity to alter every of man's social interactions.

Anyone who takes a critical examination of all the definitions provided by scholars may reach a conclusion or resolution that revolves around the fact that artificial intelligence as a transformative innovation brings together many disciplines ranging from computer science, technology, mathematics, educational technology, engineering, sciences, information and communication technology and philosophy. On the basis of the conglomerate nature of artificial intelligence in terms of the various disciplines that combine to give it its foundational and epistemological constituency, it can be right to say that the field of artificial intelligence is interdisciplinary, cross-disciplinary and multi-disciplinary so much that a guiding philosophy that is fast becoming a norm in the discipline of artificial intelligence is one that incorporates system and disciplinary integration in order to achieve one common goal. In all of these, there is a core value namely a conscious drive to sustain key characteristics of artificial intelligence such as adaptability, learning and participatory action and this aligns with the position of Tuomi (2018) who writes that the whole idea of artificial intelligence revolves around the "conjecture that every aspect of learning or any feature of intelligence can in principle be so precisely described that a machine can be made to stimulate it".

One area of human endeavour that provides robust and vibrant space for the harnessing and exploration of the multiple and limitless potentials of artificial intelligence is the education industry, particularly teaching and learning. The next section of this paper exclusively focuses on the prospects of using artificial intelligence in teaching and learning in Nigeria.

Prospects of using Artificial Intelligence in Teaching and Learning in Nigeria

The education industry generally and teaching and learning in particular is a receptive hotbed for innovations of different colourations and configurations and part of what makes innovations in education particularly teaching and learning a norm is the fact that human nature and by extension the society is dynamic is perpetually and in a state of constant change, a development that makes change a constant variable in the day-to-day affairs of man and his institutions. As man and his society or institution changes, so must education, which is the institution for forming, reforming, sensitizing and socializing man change both in content and the means through which it is provided. In fact, as man changes through advancement from primitive to a complex and sophisticated society, so must education change through reflecting the realities of man in his drive to control, conquer and dominate his environment. One thing of interest about change and innovation in education is that other disciplines attempt to manipulate and influence change in education and in recent times, there is an avalanche of competition from across disciplines on which discipline should make the most significant impart and influence on education in terms of being the innovation hub for bringing about

revolutions, reforms and transformations in education. In the orgy of such competitions for innovation in education, most scholars point hands in the area of artificial intelligence as an innovative direction that has potentials and edge over the others to bring about quality transformations in teaching and learning. In other words, scholars agree that artificial intelligence has many prospects in the education industry particularly in teaching and learning.

Artificial intelligence as a conglomerate of many disciplines that fuses together as a "crossbreed of human and machine" especially the ability of machines to think and act like human beings is specifically and especially helpful to the teacher in his teaching task and responsibilities in the classroom and administration of the educational institution. In the course of the teacher teaching learners, the teacher can effectively use artificial intelligence, in his teaching learning process in a systematic, orderly and organized manner so much that he becomes more critical and creative in introducing empowering and transformative innovations and skills that can support and enhance productivity. This, by extension and implication means that the use of artificial intelligence by the teacher in his teaching can help to reduce boredom that results from the continuous repetition of the same practice in the classroom. In fact, those teachers who are fade up with the repeat of the same practice all the time can break the monotony which such teachers face in the classroom through effective use of artificial intelligence and what can result out of this according to Bates (2018) is increased productive outcome on the part of both the teacher and the learner.

The use of artificial intelligence by the teacher in his teaching and learning can make the teaching and learning exercise more fascinating and more interesting especially as the deployment of artificial intelligence in teaching and learning has potentials to increase the participation of learners, a development that practically results in increase in retention. In short artificial intelligence is supportive of teacher-student interaction.

In most developing states where the states have lackadaisical attitudes towards education and fundamentally demonstrate this through non-recruitment of teachers in commensurate numbers, effective use of artificial intelligence can come to the rescue of the citizens. What this implies here is that effective use of artificial intelligence in the education industry of states can increase the citizens' access to education and through this way help to address such hydra-headed and social issues such as equity and equality of educational opportunity. In fact, the use of artificial intelligence in teaching and learning can help to address issues of equity and equality in education. Related to the above is a serious revelation about effective use of artificial intelligence in teaching and learning namely creative use of artificial intelligence in teaching and learning lowers the cost of providing education to the barest minimum for the masses.

As an innovation where machine thinks like a human being, artificial intelligence can help the teacher in dictating the originality or otherwise of works students submit for assessment and what this introduces into the education system is a kind of high alert where students are sensitized to always be their original self in all submissions for assessment. That students are warned against this makes them to be more critical and serious in their academic pursuit. Still on assessment, not only can artificial intelligence be used in assessing learners, it can equally be used in assessing teachers' instructional and pedagogical manipulations and effectiveness. Teachers whose performances are below expectations or leaves much to be desired can after watching their performances via automated artificial intelligence system initiate measures for their self-improvement. In any case, these features of artificial intelligence show that the use of artificial intelligence in teaching and learning enhances and improves the professional growth and development of the teacher and the learners.

A more robust prospect of artificial intelligence especially its use in assessing students' work in the school is provided by Celik, Dindar, Muukkonon & Jarvella (2022) when they write that artificial intelligence enhances examination automation, makes scoring easier as well as fast tracks decision making on students' performances. Along this line of thinking, artificial intelligence equally makes work easier for the school administrators (administrative efficiency). This occurs when school administrative tasks and responsibilities have been autom8ated through the use of artificial intelligence. Through the use of artificial intelligence, teachers and learners can quickly receive answers to any academic problem that is of concern to them. This can be pointing to quality improvements in research that both teachers and learners can enjoy in a regime where artificial intelligence has come to stay.

Artificial intelligence is a robust platform for the actualization of individualized instructions for every learner, suggesting that every learner in the new dispensation can learn at his or her speed without any inhibition or constraint. What this prospect of artificial intelligence reveals is that artificial intelligence has the capacity and capability to provide a universal classroom and learning space for every learner across the globe. That artificial intelligence is capable of doing these points in the direction that the war against illiteracy can easily be won and humanity is about to ignite a human capital development revolution that can bring about real and genuine transformation capable of triggering and stimulating quality sustainable national development across the globe.

Some scholars have in one way or the other summarized the prospects of artificial intelligence in teaching and learning. According to Bulmer & Wojcik (2024:1) artificial intelligence can help teachers to:

1. Automate and personalize grading
2. Complement the existing course material
3. Save time with grading, aiding them in providing constructive feedback to students and help them to become efficient
4. Help the students on a more personal basis

In the same way, Zuboff (2019) writes that artificial intelligence can be applied in teaching and learning in the following ways:

1. Profiling and prediction
2. Intelligent tutoring system
3. Assessment and evaluation
4. Adaptive systems and personalization

From the above benefits which can be derived from the use of artificial intelligence in teaching and learning in educational institutions, any one without much technical sophistication in the art of critical and analytic thinking can quicky acknowledge that artificial intelligence as an innovation particularly in teaching and learning is out to bring about genuine transformations that can revolutionalize the ways things are done particularly in the education industry and without any iota of doubt such transformations and revolutions can surely boost human capital development and human capacity building of states, developments that have potentials to translate and bring to fruition the actualization and realization of any conception of sustainable development as aspired by any state across the globe. What this simply translates into is that artificial intelligence as an innovation and its use in teaching and learning is a trigger in the education industry whose effective use can become a dynamic mechanism and a game changer for taking humanity to the next level of sophisticated development, which has never been experienced in the history of man.

CONCLUSION

Innovation drives human development in all the endeavours of man and innovations in education particularly in teaching and learning make the most important impact in the development of man and his society. One innovation in the 21st century whose deployment in teaching and learning has been most impactful is artificial intelligence. Artificial intelligence is a multidisciplinary, interdisciplinary and cross disciplinary creative innovation where computer science, engineering, educational technology, science, technology, philosophy and information and computer technology are systematically integrated together and such creative innovative breakthrough results in machine thinking, talking and performing tasks and responsibilities like human beings. This phenomenal epistemological breakthrough of the 21st century has brought about quality revolutions and transformations in the life of man in the form of making work easier in all spheres of life where work is required or where work is to be done. In fact, all areas of human endeavour benefit from the creative manipulations and imaginations of artificial intelligence so much that artificial intelligence can rightly be described as a phenomenal asset to humanity.

What has triggered the artificial intelligence revolution and transformation is interdisciplinary, cross-disciplinary and multi-disciplinary collaborations and this suggests that collaboration is essential and necessary for the breaking of epistemological frontiers across disciplines. In fact, the systematic integration of many disciplines in the development of artificial intelligence is a unique epistemological breakthrough which rightly owes its success to sense of collaboration among the

various experts in the various disciplines that have been implicated in this breakthrough. It is our humble submission that experts across disciplines sustain the type of epistemological collaboration that resulted in the development of artificial intelligence. It is very important we point out that more of such interdisciplinary, cross-disciplinary and multi-disciplinary collaboration is needed if humanity is to tap or explore the hidden treasures of nature and correspondingly take humanity to the next existential level. In short, the curiosity for interdisciplinary, multidisciplinary and cross-disciplinary collaborations should be intensified so much that such spirit and curiosity become norms in education and among researchers. Where this is sustained, humanity can be rest assured of innovations and breakthroughs that can positively reform and transform the society.

Specially in teaching and learning, artificial intelligence has laid the foundations for speedy and inclusive access to education through personalizing instruction, has brought about quality improvement in research, has boosted learners' confidence, has improved administrative efficiency, has enhanced professional growth and development of the teacher, has lowered cost of providing education as well as reduced time for completing various tasks in education. In all of these, all is still not perfect as there are still rooms for quality improvement in the use of artificial intelligence in teaching and learning.

States and individuals should make quality investments through the provision of the right infrastructure for artificial intelligence revolution and transformation in education so as to ensure that every school and every learner is artificial intelligence compliance. Stakeholders in teacher education should reposition teacher education so much that knowledge of the development of the production of the necessary ecosystems that are conducive and supportive of the functioning of artificial intelligence can be a topmost priority and a requisite knowledge that learners in teacher education institutions must acquire in the 21st century. Countries and individuals that have the expertise in artificial intelligence should consider extending or liberalizing such knowledge to countries and individuals that do not yet have such knowledge and expertise, in the hope that humanity will be better off if and only if critical knowledge such as that of artificial intelligence is evenly and equitably shared among the members of the global community.

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