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## **Abstract**

The paper analyses the role of artificial intelligence in early childhood education in Nigeria. Through a comprehensive analysis method, the paper explored the artificial intelligence resources that can be utilized in early childhood education and their relevance in inculcating social, intellectual, and emotional skills to the child. It also examined the challenges to artificial intelligence education, analyze the content, curriculum, method of instruction and the pedagogic practices in early childhood education and made recommendations for the way forward. The findings of the paper reviewed that artificial intelligence tools if appropriately integrated with curriculum materials and sound pedagogic practices can enable teachers to provide enriching and engaging learning experiences to the child; and can also, promote digital literacy and the inculcation of social, intellectual and emotional skills in the child. It further found out that artificial intelligence tools such as intelligent tutoring system can provide personalized learning experienced to learners. The paper concluded that the utilization of artificial intelligence in education can transform the educational landscape of school children by developing valuable skills and competencies in them. However, the paper noted that this would require addressing the challenges of poor policy implementation and ethical concerns in order to ensure that artificial intelligence does not hamper individual freedom and ethical concern. Based on the findings, the paper recommended that artificial

intelligence tools should continually be used in education because of its obvious benefits and that the Government and stakeholders in education should provide artificial intelligence tools for the teaching and learning process.

**Key words: Artificial Intelligence, Early Childhood, Education, Integration of Technology and pedagogic practices**

## **Introduction**

Artificial intelligence has become inevitable in the 21<sup>st</sup> century teaching and learning. The word artificial connotes, a thing that is not natural; something made or produced by human rather than occurring naturally especially as a copy of something natural. Examples could be given of artificial sympathy, artificial dress, artificial light, etcetera. Intelligence on the other hand is the ability to acquire and apply skills in problem-solving. For Dewey in Okere (2018), intelligence depicts the mental capacity of an individual to learn from experiences, adjust to new situations, understand and handle abstract concepts and use knowledge to manipulate one's environment as well as to solve problems scientifically.

Artificial intelligence (AI) is defined by McCarthy in Okere (2021) as the sciences and engineering of creating intelligent machine. The goal of artificial intelligence's research is to create intelligent machines that can perform a variety of tasks using methods including machine learning, neural networks and natural language processing. Artificial intelligence is revolutionizing a wide range of sectors such as science, psychology, public policy and heals, (Suriya, 2024). Education can benefit from the use of artificial intelligence in a number of ways including the automation of assessment, prediction of students' performance and learning outcomes and recommendation of learning resources. (Okere, 2022). Artificial intelligence enables an individual to solve coupler problems and make national decisions with beneficial outcomes within his socio-political and psychological environment.

Early childhood care and development education (ECCDE) is an education that caters for the development of the Nigerian child. Given the philosophical slant of the Nigerian education system, the individual is to be developed into a sound and effective citizen, the integration into his community and the provision of equal educational opportunities for all citizens of the nation at all levels of education from crèche, pre-school, nursery/kindergarten, basic, secondary education and tertiary levels both inside and outside the formal school system, irrespective of gender, ethnic, religious or socio-economic background (Obinaju, 2022).

Childhood education is the education encompassing the Early Childhood Care and Development Education (0-4) years; Kindergarten, (5-6) years; primary Education, (6-12) years (Okere, 2022). Childhood education is critical to Nigeria's quest for social and economic development. it is in recognition of this fact that the Government is committed to the setting up and the monitoring of standards at this level of education to develop and disseminate curriculum materials; make conscious efforts on capacity building, development of personnel, and the sensitization of communities and the nation in general to ensure that

relevant ministries, departments and agencies, as well as the development partners are synergized for proper implementation of childhood education. The motivation for this level of interest lies in the set objectives of childhood education. These objectives according to the Federal Republic of Nigeria (FRN,2013) include the following:

- Effect a smooth transition from the home to the school;
- Prepare the child for the primary level of education;
- Provide adequate care, supervision and security for the children while their parents are at work;
- Inculcate social, moral norms and values;
- Inculcate in the child the spirit of enquiry and creativity through exploration of nature, the environment, art, music and the use of toys etc;
- Develop a Sense of Co-operation and team spirit;
- Teach the rudiments of numbers, letters, Colours, shapes, forms, etc through plays; and
- Provide opportunities for the child to develop manipulative skills that will enable the child function effectively in the society within the limits of the child's capability among others.

Notable philosophers and educators in childhood education such as Plato, Pestalozzi and a host of others have at one time or the other made contributions to childhood education emphasizing its importance in the intellectual, moral and social development of children and have also advocated teacher's training and the use of appropriate and adequate teaching methods and strategies in handling children at this level of education.

This paper therefore, aims at exploring the available artificial intelligence resources and devices which teachers can utilize in the childhood schools; examine how artificial intelligence mediated education system can equip the child with the necessary knowledge, skills and values for self and national development. It will also, highlight the problems inherent in artificial intelligence driven education system as well as make recommendations for the way forward.

### **Concept of Artificial Intelligence**

Artificial intelligence is the theory and development of computers by system capable of performing task that artificially required human intelligence such as recording speech, identifying patterns, etc. It is an umbrella term encompassing a wide variety of technologies. It uses multiple technologies that equip machines to sense, comprehend, plan, act and learn with human-like level of intelligence (Toader in Nwadiago & Otumegwu, 2025). Among the tasks and responsibilities that could be performed using artificial intelligence mediated tools include; machine and interactive learning environment, behaviour analysis, content creation and monitoring and evaluation to mention a few.

Artificial intelligence systems can be used to monitor learner's interactions, and behaviors which can help educators to identify patterns and provide timely interventions for children that may need additional support in social skills or emotional regulation. Through this means,

artificial intelligence can inculcate in the child the spirit of inquiry and creativity, problem solving and collaborative skills for living in this 21<sup>st</sup> century computer age. However, over dependence on artificial intelligence can lead to over reliance on technology which could raise concerns about data privacy and ethical considerations. It is crucial to balance technology with traditional teaching methods and emphasize robust safeguards to protect children's information (Zuboff, 2019).

Artificial intelligence tools are subsets of computer assisted learning machines and devices which are simulated in the form of human intelligence to do the work which humans can do. Tiro, (2022) believes that artificial intelligence tools are technology driven devices which are automated based on human commands to help man solve all forms of human problems. Thomas (2024) lends his support to the above view when he opines that new concepts and tasks, to reason and to draw useful conclusions, understand a natural language or perceive and comprehend a visual scene using human type of reasoning can be undertaken through artificial intelligence tools. Artificial intelligence tools can perform multifaceted functions in the teaching and learning process ranging from personalized productive learning behaviour, such as self-regulation, self-monitoring and self-explanation. This is made possible by providing learners with activities at the learners own pace and with the most appropriate content, timely guidance feedback and explanations (Thomas, 2024). Anulobi & Azubuike, (2020) is of the view that artificial intelligence tool such as intelligent tutoring system (ITS) provide personalized learning experiences to learners and offer automatic correction of certain kinds of school work which can enable teachers to finish their tasks faster and achieve educational goals. He further stated that artificial intelligence can help teachers to adjust teaching and learning to meet the aspirations, interest and needs of learners, thus helping each learner to learn at his/her own style, monitor his learning processes and make necessary adjustments to improve in his learning.

### **Concept of childhood education**

Nigeria has a philosophy of education that is aim at making them become an effective and functional member of society. This philosophy aims at inculcating national consciousness and unity; the inculcation of the right type & values and attitude for the Survival of the individual and Nigerian society; the training of the mind in the understanding of the world; and the acquisition of appropriate skills, abilities and competences both mental and physical as equipment for the individual to live in and contribute to the development of the society.

The philosophy of childhood education in Nigeria is the preparation of children for life and creating in them the love for education respectively. A broad purpose for early childhood education is the socialization of children into the rubrics, basics or fundamentals of the first stages of education. The broad objectives as outlined in the National Policy on Education are:

- The inculcating of national consciousness and national unity;
- The inculcation of the right type of values and attitudes for the survival of the individual and the Nigerian society;
- The training of the mind in the understanding of the world; and

- The acquisition of appropriate skills, abilities and competences both mental and physical as equipment for the individual to live in and contribute to the development of society.

### **Childhood education in Nigeria**

The area of learning of childhood education falls categorically into four aspects of learning and include:

- i. Social and emotional learning;
- ii. Language learning;
- iii. Intellectual development;
- iv. Physical development.

Going by the nature, content, objectives and characteristics of early childhood /kindergarten education, we can understand that a lot of value orientation, attitudes, knowledge, skills and competence necessary for evolving an effective and efficient citizenry can be acquired. Early childhood education can provide the moral, emotional and intellectual foundations on which individual, group and national identity can revolve and impact each other in order to foster the development of individuals who are conscious of their rights, duties and obligations which are building blocks for national unity, national consciousness and national integration as canvassed by the Nigerian philosophy of education. Early childhood education also instills in the youths, the spirit of cooperation, sympathy for each other, the recognition of individual differences, sensitivity to the feelings and interest of fellow citizens; the spirit of occupation and honest labour.

The curriculum of early childhood education recognizes the importance of a child's environment to his physical and intellectual development. The child begins to acquire certain basic values right from his youth-adaptation to his environment for survival and for imitating certain actions in order to overcome the challenges of his environment. When children stay together and play in and outside their classroom, it fosters the spirit of unity, teamwork, sharing, mutual give-and-take; appreciation of the strengths and weakness of each other and so on.

From the foregoing analysis, we can understand that curriculum plays a vital role in early childhood education. As observed by Pestalozzi in Okere (2021) a child's natural education should emphasize sensory-based learning. For him each human person possesses inherent intellectual, moral and physical powers. Given this view of tripartite nature of humans; the mind is conceived as the source of intellectual power, the will as the source of moral power, and the body as the source of physical power. Pestalozzi believes that when the three powers are cultivated, and developed harmoniously and simultaneously, would be the means of correcting crime, injustice, poverty, and other social vices.

In furtherance to his thoughts on education, Pestalozzi believes that an individual's education is closely related to the well-being of society. Education could become a force to create a new and human social order. He believes that a child's education should be organized into two related phases: the general and the special method. The general method of emotional security

and wellness. The special method would create sensory learning and concept formation. Pestalozzi general method of instruction is based on his first impression of infancy especially, the mother-child relationship in which the infant's basic needs of food, warmth, and affection are satisfied by the good and loving mother. This mother-child interaction creates a bond of love, and a circle of positive emotion between them. He opines that the attachment created by the satisfaction of natural human instincts is necessary to forming an emotionally secure child. The positive mother-child emotional relationship would enable the child to respond to other people with love, trust, and affection. He further stated that the continuous state of emotional security would eventually graduate into an international circle of human community, made up of people of different nations, ethnicities, and languages.

Okon in Okere (2021:214) noted that integration plays a role in intellectual development of the child when he averred that "experience shows that the hardest intellectual task a student faces is how to put together or integrated into a coherent whole the details of each discipline he has mastered". Integrated approach to learning is advantageous in the following ways:

- i. It is activity-oriented, encourages participation of the learners irrespective of their differing abilities and potentials and therefore, accommodates the needs, interests and demands of the learners and those of the entire class.
- ii. The integration approach exposes the learner to all facts of life thereby endowing him with the intellectual resources to deal with issues, and problems that may confront him in his society.
- iii. It affords the learners and the teachers alike the opportunities to be resourceful and creative in their real life situations. Suffice it to say therefore, that the above observations together with the educational bias of the concept of integration shall inter-changeably be useful to analyze the role of early childhood education in bringing about national integration/security.

Mezieobi in Okere (2018), believes that government should encourage the achievement of early childhood education objectives through the following actions;

- encourage private efforts in the provision of early childhood education;
- Make provision in the teacher training institution for student teachers who want to specialize in early childhood education;
- Ensure that the medium of instruction will be principally the mother tongue or the language of the immediate community;
- Ensure that the main method of teaching at this level will be through play, and that the Curriculum of teacher training college is appropriately oriented to achieve; and
- Regulate and control the operation of early childhood education as well as ensure that the staffs of early childhood institutions are adequately trained and that essential equipment is provided.

Schools should complement the child's home experiences by providing similar experiences in the school. Teachers should prioritize the needs, interests and aspirations of the child while teaching. Teachers are responsible for translating educational objectives and principles into

actions and practices in their interaction with the children. This would require the mastery of their subject's matter and the adoption of appropriate teaching methodology and pedagogical practices. As agents that inhabit both the world of the learner and of the adult society, the teacher should understand major trends in contemporary education and prepare the youth to meet adequately the problems they will encounter at their mature period.

It is evident in contemporary Nigerian education that only a few curriculum planners and educationists are fully aware of the implications of early childhood education. This ugly situation cannot promote the policies and guidelines needed to ensure a smooth transition of school children from the home to the school. A system where the major stakeholders and players of the policy are not properly informed of the system's guidelines would result in the failure of the system. However, the sustainability in the educational system whose utmost thrust is functional and systematic development of the intellectual, language, emotional, social, and physical skills in the child from the kindergarten through the other value systems up to the career development point should focus at mitigating the social ills that are besetting the Nigerian society in disguise of unemployment, poverty, and low standards of living.

### **Artificial intelligence and Early Childhood Education**

The use of artificial intelligence tools in teaching and learning has become the new normal in today's education system. Artificial intelligence has the potential to perform most tasks that could be done in the teaching and learning process. These include; administrative work, coordinating documents, analyzing the patterns of learning at schools as well as responding to different questions and task. According to Mahlange (2018) artificial intelligence can make computers think like human being and perform human task. It is the automation of task associated with the thought, such as decision-making, problem solving and learning. Artificial intelligence systems can utilize computers to think and act humanly and rationally. In line with childhood education, schools should equip the children with necessary social, intellectual and emotional skills for living a useful and productive life styles. Early childhood education requires that the child should be assisted to have a smooth transition from the home to the school. This means that schools should complement home experiences and teachers are responsible for translating educational objectives and principles into action. Interactive learning environments such as virtual or augmented reality experiences that engage children in exploration and discovery learning can enhance co-operation, teamwork, unity and harmony among young learners. Artificial intelligence can help to bring about networking and collaboration among learners. It can foster the development of social skills which can lead to job opportunities and professional growth (Rennie & Mason, 2013).

Early childhood education requires that the medium of instruction should principally be the mother tongue or the language of the immediate community. This would require that the method of instruction should involve play, story-telling and other modes of inculcating social, cooperative and emotional skills. Artificial intelligence driven tools can support language acquisition through interactive storytelling, speech recognition, conversation practice, and helping young learners to develop communication skills. Artificial intelligence powered

tutoring systems can provide feedback and support to young learners. It can also, identify, areas where a child may need assistance in his learning needs with a view to providing remedial exercise and measures. Through this means, children build valuable concepts, social norms, and effective means of communication. This helps to achieve both national objectives and early childhood objectives.

Artificial intelligence can facilitate language development. This can be done through storytelling, speed recognition, and pronunciation feedback. Tools like chatbots, can engage children in conversation, promoting vocabulary and language skills. These provide the children with opportunities for acquiring literacy and numeracy skills for early child-education. It can also help to build children's understanding of each other which is a prerequisite for building communication and social harmony among the learners. According to European Commission (2020), artificial intelligence can promote a culture of continuous learning, encouraging individuals to update their Skills regularly, which is vital in building life-long learning skills.

Early childhood education requires the moral, emotional, and intellectual development of the child. This would result in fostering the development of individuals who are conscious of their rights, duties and obligations for building a resilient and integrated national economy. It would also instill the spirit of co-operation, sympathy for each other and the recognition of individual differences. Artificial intelligence can engage learners in personalized learning. Productive learning behaviours such as self-regulation, Self-monitoring and self-explanation can be provided to learners based on their own pace and at their own time. Analysis of individual learner's data can be carried out to tailor learning experiences to each child's learning needs. Artificial intelligence can enhance adaptive learning behaviour and foster individual child's progress at his/her own pace. This could help to ensure that a child's education is properly adapted to his individual needs and social environment. The use of artificial intelligence in education can enable the teacher to adapt teaching and learning in line with the aspirations, interests and needs of the child. This would promote different learning styles, monitor learning processes and make necessary adjustments to improve learning behaviours. Teachers can provide feedback, and relevant learning materials to the child, Reddy & Zhang (2019).

### **The state of the art and the way forward**

This paper has extensively discussed artificial intelligence and early childhood education reflecting how each relates to the other. Education in the 21st century Nigeria appears to be dependent on the use of artificial intelligence technology. The principal medium of transmission of Knowledge, Skills and values of the society is the teacher. The teacher has the onerous task of mediating between the world of the learner and the world of the adult society. The teacher should ensure that whatever knowledge he is imparting to the child should be of societal significance and acceptance. This he would do by sound knowledge of the subject-matter and the pedagogic practices. He should also consider the learning environment and his expectation of the learner in order to ensure that learning is enjoyable to

the child and approximates to societal expectation as expressed in the National Policy on Education.

The Nigerian educational objectives should provide the road-map for the teachers' activities and the teacher should ensure that learning inside and outside the classrooms should be a continuum and should remind the child of the societal expectations.

Childhood education presents a comprehensive and holistic educational process that can energize learners towards acquiring the skills that can be offered by the integration of artificial intelligence in education. Education should serve as building blocks for national unity, national consciousness, national integration, and pathways to inculcating civic and democratic values to the Nigerian child. In this education system, the child adapts to his environment for survival and for imitation of certain actions to overcome the challenges of his environment. The curriculum of instruction should be such that allows the individual to interact with persons and ideals in order to deal with social and political issues of life such as fighting crimes, injustice, poverty and other related social vices.

The achievement of the above objectives can be facilitated through the use of artificial intelligence (AI) and other information and communication technology (ICT) devices. At present, most public early schools in Nigeria are still using the traditional instructional media such as chalkboards, textbooks, charts and models etc, (Anulobi & Azubuike 2020). These instructional delivery strategies are prone to regimentation, memorization and rote learning. Learning is less likely to be actively engaged in the learning process; a situation that may not develop autonomous tendencies in children and less likely to promote curiosity, inquisitiveness and creative abilities in the learners (Dewey in Okere, 2022).

From the foregoing, artificial intelligence tools can be integrated into the teaching and learning process. Artificial intelligence has the potential to promote teaching and learning process by providing effective learning atmosphere characterized by opportunities for interaction and communication. Artificial intelligence tools can also be utilized in early childhood education for lesson presentation, developing teaching materials, problem solving, and making decision or forming opinions.

The use of artificial intelligence and ICT tools can be used to facilitate education-related data collection and processing in ways not possible before, and provide a fundamental building block upon which to base a set of knowledge and information. These tools can also expand the pedagogy resources and practices in the hand of the teacher for effective classroom instruction.

However, a teacher's competence toward the integration of artificial intelligence in his educational practices is dependent on teacher education and training on one hand; and teacher educators on the other hand. This will further depend on the availability and adequacy of artificial intelligence tools and infrastructure in early childhood education.

## Conclusion

The integration of artificial intelligence in early childhood education can present a transformative opportunity to enhance learning experiences and outcomes in children which could foster the development of social, emotional and intellectual skills needed to ensure a smooth transition from the home to the school, and for building a strong and resilient national economy. By personalizing learning, fostering social-emotional skills, and leveraging immense technologies, artificial intelligence can enable educators to create engaging and effective learning environment. However, these potential benefits will grapple with addressing the challenges related to equity, data privacy, and ethical concerns. The future of early childhood education will depend on policy implementation, teacher's professional development, and appropriate guidelines that ensure responsible use of artificial intelligence. In this manner, artificial intelligence can yield the much needed impetus for inclusive, innovative, and impactful educational system for early child education.

## Recommendation

When integrating artificial intelligence into early childhood education, several recommendations can enhance its effectiveness to ensure a supportive learning environment. These recommendations include:

- i. Artificial intelligence should be used in education to promote teaching and learning.
- ii. Teachers should be professionally trained to utilize artificial intelligence tools.
- iii. Government should fund education appropriately.
- iv. Stakeholders in education should assist in the provision of artificial intelligence tools and other teaching and learning resources.

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