

REVOLUTIONALIZING EARLY CHILDHOOD EDUCATION SCHOOLS THROUGH ACCEPTANCE OF ARTIFICIAL INTELLIGENCE TOOLS FOR ACADEMIC ASSESSMENT IN BENUE STATE.

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Abstract

This study aimed at determining the extent to which teachers in early childhood education schools in Oju, Benue State accepted to use artificial intelligence tools for academic assessment. In particular the study was guided by the Technology Acceptance model (TAM) of Davis (1989). Four objectives guided the study and four research hypotheses were formulated and tested at 0.05 level of significance. The study employed descriptive survey design and the population comprised 350 teachers in Oju L.G.A, out of which 232 teachers were randomly selected as the study sample. A valid and reliable instrument, adapted from Sanchez-prieto, Cruz-Benito, Theron and Garcia-Pennalvo (2020), titled "Artificial Intelligence tools acceptance scale (AITAS) was used for data collection. Data were collected electronically and was analyzed with SPSSV, 23 using both descriptive and inferential statistics. The findings revealed that, although there exists significant difference among teachers in the early childhood schools in the acceptance to use AI tools for academic assessment, these differences were mostly within the schools, whereas majority perceived AI tools to be useful for academic assessment, and that AI tools are easy for that purpose. Furthermore, it was found that most of them have positive attitudes toward using AI tools for academic assessment, and that they intend to use it for that purpose when all necessary arrangements are put in place. Based on these findings, the researcher proposed some recommendations that would facilitate easy incorporating of AI tools for effective assessment of pupils' academic achievements in early childhood schools in Benue State.

Keywords: *Early childhood education, Artificial intelligence tools, acceptance usefulness.*

Introduction

Globally, it is essential that everyone should be able to read and write and for this important reason, education, must always be the keystone for social services in any country. Education is the best legacy any nation can bequeath her citizens and this in turn helps in national development. Basic education is very important because for any nation (Nigeria) to assume a worthy place among other nations in the world, that country has to ensure basic education for her citizens.

Generally, Education means the overall development of the human person. According to the National Policy of Education (2013), education is referred to as the total preparation of the individual for useful living within, the society. Education is seen as a means of acquiring worthwhile knowledge, skills, values, attitudes or behaviour acquiring competence and understanding through morally acceptable ways in the society in which the child lives.

Clearly, all the goals of education listed above cannot be effectively achieved without the teacher whose responsibility it is to direct all round development of the individual learner. Teaching given or provided in an institution to teachers would enable them acquire, inculcate, assess and impart knowledge to their pupils. Introduction of Artificial Intelligence (AI) for educational teaching and learning at Early childhood level, will help to facilitate teacher's ability to use AI for academic assessment of the pupils. AI tools are veritable in assisting learners to learn with ease particularly in teaching at this level which will go along way to create easy understanding of concepts by the pupils thereby revolutionizing early childhood education in Nigeria.

Concept of Early childhood Education

Early childhood education and pre-primary education are used interchangeably; early childhood education is the form of nursery school. It is the organized practice of educating those who are in early childhood and late hood, one of the most vulnerable stages of life. This level of education is meant for children aged 0-4 prior to their entering the primary school. The aim of this education is to effect a smooth transition from home to school and preparing a child for primary school education. This is in line with stipulations of the current National policy on Education (FRN 2013), which clearly states: Early child care Development and Education (ECCDE) is the care, protection, stimulation and learning promoted in children from age 0-4 years in a crèche or nursery. The purpose of early child care development and education shall be to:

- a. Effect a smooth transition from home to the school;
- b. Prepare the child for the primary level of education;
- c. Provide adequate care, supervision and security for the children while their parents are at work;
- d. Inculcate social, moral norms and value;
- e. Inculcate in the child the spirit of enquiry and creativity through the exploration of nature, the environment, art, music and the use of toys etc.
- f. To develop a sense of cooperation and team-spirits
- g. Stimulate in the child good habits, including good health habits: and
- h. To teach the rudiments of numbers, letters, colors, shapes, forms etc. through play

In order to revolutionize early childhood education, the use of Artificial intelligence must be sorted; this is because it holds great potentials for teaching and learning at this level. Teacher's acceptance in the use of Artificial intelligence tools is desirable. This is because teachers will use AI for easier computation of results as well as in carrying out effective research.

Artificial Intelligence

The Quest of man to live a much easier and less tasking life has led to numerous technological inventions among which are those driven by Artificial intelligence (AI). AI tools deals with the application of software in machine to enable those machines do that which originally requires human intelligence for its performance. It is a branch of computer science which deals with the scientific study of what problem can be solved, what task can be accomplished and what feature of the world can be understood computationally and then provides algorithms to show how this can be done efficiently, practically, physically and ethically (Rapaport, 2017).

Slimi, (2023) opines, Artificial intelligence as a vast branch of computers capable of doing tasks that typically need human intelligence. Also Ceiguruilo (2020) alludes AI as a tool for acquiring information on the surrounding, environment and make sense of it, in orders to act rationally and autonomously even in uncertain situations. It is described as the technological future that happens to make the lives of human beings a lot easier, and a booming technological domain capable of altering every aspect of our social interactions. AI is becoming more attainable in many sectors of the economy, including early childhood education schools. In reality, AI enables early childhood education to become more scalable than ever before, both inside and beyond the classroom, this is due to the fact that AI can assist teachers in grading and providing struggle pupils with the resources they require to succeed, and in the future, this could free up school members to supervise huge classrooms will still connecting with pupils on a deeper level (Klutka, Ackerly, & Magda, 2018). Again, AI is responsive, decisive, adaptive and autonomous. It is responsive because it can communicate with humans and other machines comprehend meaning, and formulate an appropriate response. It is decisive because it can analyzed, provides information and take necessary action to attain its stated objectives. It is adaptive because it can internalize new knowledge and modify its behaviour to maximize its effectiveness. It is independent because it can make the majority of its decisions without the need of human intervention. Nowadays, AI is employed in a variety of scenarios, and is affecting millions of people each day and is driving amazing inventions around the world. Researchers have used AI, in education in diverse ways, despite the fact that the field is expanding. They used AI to address complex issues, analyses students' behaviour, personalize learning, detect learning styles, assist pupils with tasks, assess performance and more (Cruz-Benito, Carlos Sanchez-prieto, Theron, & Garcia-Penalvo, 2019).

Furthermore, application of AI in early childhood education in various countries of the world such as USA, Canada, Japan etc. reveals that children can learn using AI toys, shapes, colours and other (Janpla & piriyasura wongs 2020). They investigated the application of AI to generate tests in e-learning environments and created intelligence software, for selecting questions relevant to the pupils in early childhood education classroom.

Over the years, AI testing tools have transformed the way and manner tests and assessment are conducted, with their ability to automate the testing process and improve the accuracy of test results. This offered several benefits to test developers, including time and cost saving, Continuous testing capabilities, prompt processing of results and feedback, as well as adaptive testing environment easy to both pupils and teachers alike, Beside the common AI, testing tools we know we can utilized in education, others include, Testsigma, Mabl, Testcraft, Testimi, 10, AQUA, ALM, ACCCIQ Functionize, Applitools, Sauce Labs, Test complete etc. all these and others can be utilized to assess pupils academic achievement with little human intervention and minimal errors (Testsigma, 2024).

In addition, AI testing tools provide a playground for testers to create advanced intelligent, and self-optimizing tests for any kind of testing. Thus, with the application of AI in testing scenarios, the use of machine learning makes test creation, execution and maintenance quite easy. These tools assist humans in countless testing activities and require minimal to no human intervention for test ease creation, test data

generations, test administration and analysis, results reporting and feedback as well as integration capabilities (Testsigma, 2024).

With these and many other benefits of AI in educational assessment and other educational fields, it is crucial to examine how teachers in early childhood education schools perceived the use of AI for assessing pupils' academic achievement. This is owing to the fact that successful implementation of AI based assessment in early childhood schools is largely dependent on the support and the attitude of the teacher toward acceptance of AI tools for pupils' assessment. The research therefore determined the extent to which teachers in early childhood education schools in Oju L.G.A accepted to use AI tools for academic assessment.

To achieve this, Technology acceptance model (TAM) developed by Davis, (1989), and modified by Davis, Bagozzi, and Warshaw (1989) was used as a guide. This model explains the technology acceptance process composed of five factors namely: Perceived Usefulness (PU) Perceived ease of use (PEU), Attitude towards the use (ATU), Behavioral intention of use (BI) and Actual use (AU).

In this study PU is regarded as the extent which teachers in the early childhood education schools perceived AI as useful for assessment of pupils' academic achievement PEU is the teachers' perception of the ease of using AI for assessment of pupils' academic achievement. AU is the teaching attitude toward using AI for assessment of pupils' academic achievement. AU is the teacher's frequency of using AI for assessment of pupils' academic achievement. AU is the teachers' intention to use AI for assessment of pupils' academic achievement.

However, in this study, the first four factors (PU, PEU, ATU, and BI) were considered as the predictor variables that may likely influence the fifth factor (AU) in a causative manner. However, this research was limited to determining how the teachers in early childhood education schools in Oju L.G.A differ on these four factors based on their various schools.

Objectives of the study

Based on the foregoing discussion, the following objectives guided the study:

1. To determine how teachers in early childhood education schools in Oju L.G.A perceived usefulness of AI tools for assessment of pupils' academic achievement.
2. To determine how teachers in early childhood education schools in Oju LGA perceived ease of using AI tools for assessment of pupils academic achievement
3. To find out attitude of teachers in early childhood education school in Oju L.G.A toward using AI tools for assessment of pupils academic achievement
4. To find out how teachers in early childhood education schools in Oju L.G.A intend to use AI tools for assessment of pupils academic achievement.

Research Hypotheses

Based on the above stated objectives, the following null hypotheses were formulated and tested at 0.05 level of significance.

- H01. Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their perceived usefulness of AI tools for assessment of pupils' academic achievement.
- H02. Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their perceived ease of using AI tools for assessment of pupils' academic achievement

- H03. Teachers in Early childhood education schools in Oju LGA do not differ significantly in their attitudes toward using AI tools for assessment of pupils' academic achievement
- H04. Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their intention to use AI tools for assessment of pupils' academic achievement.

Research Methodology

The design adopted for the study was a descriptive survey design. This is a systematic and structured approach of collecting data from a sample with the main aim of providing detailed and accurate description of the phenomena or solution as it is, without administering any kind of treatment on the target group. The target population comprised all the teachings staff in early childhood education schools across Oju LGA. At the time of conducting this research, there were 350 teachers (Both private and public schools) across seventy schools. For the purpose of this research, 232 were randomly selected as the research sample, out of which, 192 (82.76%) were females and 40 (17.24%) were males, data was collected electronically using an instrument, titled Artificial intelligence Tools Acceptance Scale (AITAS), it was adapted from Sanchez-priet, Cruz-Benito, Theron and Garcia-Penalvo (2020) and consisted of 20 items in a liker scale format, the instrument was found to be valid and reliable, as it was face validated by experts in test and ne measurement from college of education, Oju Its internal consistency reliability was determined using Cranach's alpha and the result obtained for the whole scale was $\alpha = .889$, while that of the four substances were $\alpha_{PEU} = .752$, $\alpha_{ATU} = .739$, $\alpha_{B1} = .815$, and $\alpha_{B2} = .754$. Hence the instrument was reliable for the intended use.

The data collected were analyzed using both descriptive and inferential statistics mean and standard deviation were used to describe the data, while analysis of variance statistic were used to test all the stated hypothesis, and the output results as obtained using IBM "SPSS" statistics V.23 were presented in Tables.

Results

H0₁. Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their perceived usefulness of AI tools for assessment of pupils' academic achievement.

Table1. Presents descriptive statics while table 2 present the summarized ANOVA output results:

Table1: Descriptive statistics of perceived usefulness of AI Tools for assessment of pupils' academic achievement

Subjects Error	N	Mean	Std. Deviation	Std.
Language Development	10	19.800	.789	.249
Number work	8	17.500	.756	.267
Sand box play	63	20.397	2.814	.355
Writing	32	19.438	3.868	.684
Reaching	24	19.208	3.501	.715
Social and	79	19.835	1.944	.219

personal habit			
Work and study	16	21.063	2.645
Habit			.661
Total	232	19.871	2.751

Table 2: Difference among teachers in early childhood education schools in their perceived usefulness of AI Tools for assessment of pupils' academic achievement

Source	Sum Squares	Df	Measures	F	Sig.
Between Groups	101.810	6	16.968	2.319	.034
Within Groups	1646.311	225	7.317		
Total	1748.121	231			

From the results in Table2, the difference among teachers in early childhood education schools in Oju L.G.A in their perceived usefulness of AI tools for assessment of pupils' academic achievement was $F(6/225) = 2.319$, $P = .034$, Based on this result, since the P-value (0.34) was less than the alpha value (0.05) the null hypothesis was rejected and the alternate hypothesis was accepted: Therefore this result implied that there was a significant difference among teachers in early childhood education schools in Oju L.G.A. In their perceived usefulness of AI tools for assessment of pupils' academic achievement.

Despite this difference, when scheffe post Hoc test was run, it was discovered that most of the differences observed were within the school members (within the Group). But between the schools (Between Groups) the differences were not significant. Therefore, the researcher concluded that although there exist significant difference among these teachers in their perceived usefulness of AI tools for assessment of pupils academic achievement, majority of them (irrespective of their schools) perceived AI tools as useful for assessment of pupils' academic achievements as indicated by their mean score in Table 1.

H0₂. Teachers in early childhood education schools in Oju L.G.A do not differ, significantly in their perceived ease of using AI tools for assessment of pupils' academic achievement. Table 3 present descriptive statistics while Table 4 shows the summarized ANOVA output result:

Table 3: Descriptive statistics of perceived ease of using AI tools for assessment of pupils' academic achievement.

Subject	N	Mean	Std. Deviation	Std. Error
Language				
Development	10	20.700	.949	.300
Number Work	8	20.250	.463	.164
Sand Box Play	63	78.667	2.736	.345
Writing	32	20.125	2.012	.356
Reading	24	18.375	3.831	.782
Social and				
Personal Habit	79	17.253	3.053	.343
Work and Study Habit	16	21.125	.957	.239
Total	232	18.668	2.989	.196

Table 4: Difference among teachers in early childhood education schools in Oju L.G.A in their perceived ease of using AI tool for assessment of pupils' academic achievement

Source	Sum of squares	Df	Mean square	F	Sig.
Between Groups	386.062	6	64.339	8.630	.000
Within Groups	1677.412	225	7.455		
Total	2063.444		231		

From the results in Table 4, the difference among teachers in early childhood education schools in Oju L.G.A in their perceived ease of using AI tools for assessment of pupils' academic achievement was $F(6/225) = 8.630$, $P = .000$. Based on this result, since the p-value (0.000) was less than alpha value (.05), the null hypothesis was rejected and alternate hypothesis was accepted. Therefore, this result implied that there was a significant difference among teachers in early childhood education schools in Oju L.G.A in their perceived ease of using AI tools for assessment of pupils' academic achievement that the differences observed were significant between teachers in the schools, social and personal habit subject and those of work and study habit, writing subject and sand box play subject, Even though with these differences, it can be seen that majority of the teachers perceived using AI tools for assessment of pupils' academic achievement as easy as possible, as indicated by their mean score in Table 3. Therefore the researcher concluded that although there exists significant difference among these teachers in their perceived ease of using AI Tools for assessment of pupils' academic achievement, majority of them perceived using AI tools for assessment of pupils academic achievement as easy as possible.

HO₃ Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their attitudes toward using AI tools for assessment of pupils' academic achievement

Table 5 presents descriptive statistics while table 6 shows the summarized ANOVA output result toward using AI tools for assessment of pupils' academic achievement

Subject	No	Mean	Std. Deviation	Std. Error
Language Development	10	18.600	1.506	.476
Number	8	20.125	.354	.125
Work Sand box	63	19.079	2.931	.369
Play Writing	32	20.500	1.814	.321
Reading	2	17.875	4.590	.937
Social and Personal habit	79	18.987	2.44	.272
Work and study habit	16	21.000	1.095	.274
Total	232	19.267	2.774	.182

Table 6: Difference among teachers in early childhood education schools in Oju L.G.A in their attitudes toward using AI tools for assessment of pupils' academic achievement.

Source	Sum of squares	Df	Mean square	F	Sig.
Between Groups	161.941	6	26.990	3.759	.001
Within Groups	1615.491	225	7.180		
Total	1777.43	1 231			

From the results in table 6, the difference among teachers in early childhood education schools in Oju L.G.A in their attitudes towards using AI Tools for assessment of pupils' Academic achievement was $F(6/225) = 3.759$, $P = .001$. Based on this result, since the null hypothesis was rejected and the alternative hypothesis was accepted. Therefore, this result implied that there was a significant difference among teachers in early childhood education schools in Oju L.G.A in their attitudes toward using AI tools for assessment of pupils' academic achievement when Scheffé post Hoc test was run, it was discovered that the differences observed were significant between teachers in area of subject such as social and personal habit and other subjects, like reading, sand box play etc. even with these differences, it can be seen that majority of the teachers have favorable attitudes toward AI tools for assessment of pupils' academic achievement as indicated by their mean scores in Table 5, therefore the researcher concluded that although there exist significant difference among these teachers in their attitudes towards using AI tools for assessment of students' academic achievement, many of them have favorable attitudes toward using AI tools for assessment of pupils' academic achievement

HO₄ Teachers in Early childhood education schools in Oju L.G.A do not differ significantly in their intention to use AI tools for assessment of pupils' academic achievement.

Table 7. Presents descriptive statistics while Table 8 shows the summarized ANOVA output result

Table 7: Descriptive statistics of intention to use AI tools for Assessment of students' Academic Achievement

Subjects	No	Mean	Std. Deviation	Std. Error
Language Development	10	19.100	1.101	.348
Number	8	22.750	.707	.250
Work Sand box	63	20.857	2.395	.302
Play Writing	32	21.406	1.073	.190
Reading	24	17.250	4.225	.865
Social and personal habit	79	21.190	1.833	.206
Work and study habit	16	20.813	1.797	.449
Total	232	20.660	2.555	.168

Table 8: Difference among Early childhood Education schools in Oju L.G.A in the intention to use AI Tools for Assessment of student's Academic Assessment

Source	Sum of square	Df	Mean square	F	Sig.
Between Groups	381.177	6	63.529	12.684	.000
Within Groups	1126.922	225	5.009		
Total	1508.099	231			

From the results in Table 8, the difference among teachers in Early Childhood Education schools in their intention to use AI tools for assessment of pupils' academic achievement was $F(6/225) = 12.684$. $P = .000$. Based on this result, since the P-value (.000) was less than the alpha value (.05), the null hypothesis was rejected and the alternate hypothesis was accepted. Therefore, this result implied that there was a significant difference among teachers in early childhood education schools in Oju L.G.A in their intention to use AI tools for assessment of pupils' academic achievement.

When schete post Hoe test was run, it was discovered that the differences observed were significant between teachers in all the schools in those subjects except that of language development subject. Even with these differences, it can be seen that majority of the teachers have favorable intention to use AI tools for assessment of pupils' academic achievement as indicated by their mean scores in Table 7. Therefore, the researcher concluded that although there exists significant difference among these teachers in their intention to use AI tools for assessment of pupils' academic achievement, majority of them have favorable intention to use AI tools for assessment of pupils' academic achievement.

Discussion:

From the finding of this study, it was found that although the research participants differ significantly in their perception about usefulness and ease of using AI tools for assessment of pupil's academic achievement, majority of them (irrespective of their schools subjects) perceived AI tools as useful for assessment of pupils' academic achievement, and that they perceived using AI tools for assessment of pupils' academic achievement as easy as possible when necessary arrangements are put in place. This finding might not be unconnected to the fact that AI can improve assessment methods in traditional classrooms by providing timely information in pupils' learning progress (success or failure), though the analysis of their learning patterns based on big data (Sanchez-Prieto, Cruz-Benito, Theron, and Garcia-Penalvo, 2020). More so, AI can demonstrate and present information that would not have been accessible with previous assessment and evaluation methods, because AI makes it possible to identify whether a learner has reached the correct answer will also providing the teacher with that learners process leading to the correct answer. In addition, AI can successfully identify learner's psychological states (e.g. bored, frustrated, sad), provide support and catered for each particular situation.

These findings agreed with that of Jia, He and Lee (2020), and Kim and Kim (2020). In these studies, findings revealed that teachers generally have positive expectations regarding the use of AI in early childhood educational settings.

They commonly expected AI to be able to provide a more effective teaching/ learning and assessment process through digitalized learning materials and multimodal human- computer interactions, as well as resolve various learning difficulties each pupils has, catering for their needs in spite of large class sizes. Moreover, they hoped for AI to significantly reduced teachers' administrative worked by taking over simple and repetitive tasks that are related to teaching assessment in general.

Also, it was found that although the research participants differed significantly in their attitudes toward using AI tools as well as in their intention to use AI tools for assessment of pupils' academic achievement, majority of them have favorable attitudes towards using AI tools for that purpose, and they have favorable intention to use AI tools for assessment of pupils' academic achievement in their schools when all necessary arrangement are in place.

This finding might be as a result of the fact that AI promises important benefits for educating such as personalized learning according to the preferences of each pupils, helping them learn at their own pace and control iterations to improve their mastery of the topic (Kim & Kim, 2022). Hence they ought to have the belief that one benefit of AI in the future will be its ability to assess pupils, provide feedback and generate and test scientific hypothesis as well as humans learning (Alexander Ai, 2019).

Again, the use of pictures, toys and robots using AI in teaching facilitate and increase pupils' interest in learning, as well as sustaining their attention (Ogoda 2013). As maintained by Kim and Kim (2022), the role of technology is not only in equipping pupils with rudimental knowledge on ICT Skills but also in achieving quality education, free from the constraints of location and time, and to encourage curiosity, creativity and collaboration.

Conclusion and Recommendation

Based on the foregoing discussions, the researcher concluded that despite different views of the research participants in their perception about usefulness and ease of using AI tools for assessment of pupils' academic achievement, majority of them irrespective of their schools perceived AI tools for assessment of pupils' academic achievement as easy as possible. They also have favorable attitudes toward using AI tools for that purpose, and they have favorable intention to use AI tools for assessment of pupils' academic achievement in their schools when all necessary arrangement are in place. Hence, they accepted the use of AI tools for assessment of pupil's academic achievement in their schools.

Therefore, the researcher recommended that teachers in early childhood education schools and other teacher's institutions in the country continue to accept AI tools for pupils' academic assessment as it will assist them in ensuring effective academic assessment of their students. Also, they should continue to have favorable attitude towards incorporating AI tools for ensuring effective assessment of pupils' academic achievement in early childhood education and other institutions of learning.

Furthermore, local, State and Federal Government should be committed in provision of AI computers and sponsor teachers in AI trainings and workshops. This will increase teacher's knowledge in the usage of AI tools for the overall academic achievement of pupils across the country.

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