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Primary Education Undergraduates' Competency in the Use of Artificial Intelligence for Learning in Kwara State

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ABSTRACTS

The goal of this study is to bridge the gap created by classroom learning by incorporating the power of current technological innovation, especially the use of Artificial Intelligence (AI) among primary education undergraduates. This study presumed that to make a successful transition to knowledge-based education, the introduction of AI would be a necessary tool to shift Nigerian education from analog to digital. Hence, this study investigated the primary education student competency in the use of AI for learning. This study adopted descriptive research of the survey type. The findings of the study were that majority of the primary education undergraduates are not skilled and incompetent in the use of AI for learning. There was no significant difference between male and female primary education undergraduate's competency in the use of AI for learning. There was no significant difference in primary education undergraduate's competency in the use of AI for learning based on university proprietorship. Students' ability to explore digital resources such as AI depends on their access to digital technologies. AI technologies should be made available, open, and accessible to primary education undergraduates, to encourage them to utilize the technologies for learning to improve learners' capability towards achieving better academic performance.

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1. INTRODUCTION

Primary education refers to the first stage of formal education. It is the stage that comes up after the pre-primary. The primary school is a school where children between the ages of 5 and 12 are given formal education. In Nigeria, it is the school that children attend before they go to secondary school. In primary school, children are exposed to a variety of subjects such as indigenous languages, English Language, French, Arabic, Mathematics of Numeracy, Basic Science, Social Studies, Health Science, Agricultural Science, Local Craft and a host of other disciplines to equip them with basic knowledge and skills which would help them to lead a meaningful life in the future (Babatunde, 2020). Primary education is the foremost and basic right of every child. To ensure the accessibility to all children is not only the duty of the government but also of parents. Apart from the home as the first agent of socialization, early childhood education and primary education are the first that introduces formal education or literacy to children. Primary education provides an opportunity for pupils to have foundational knowledge about formal education and also the opportunity to socialize with others who are not their family members (Olaniyan & Obadara, 2008).

According to the national policy on education in Nigeria 2014, the purposes of primary education in Nigeria include the teaching of permanent literacy, numeracy, and the ability to communicate in a child's native language and English language effectively; laying a sound basis for scientific and reflective thinking; encouraging a sense of belonging-citizenship education; training the children in moral and character training; the ability to adapt to changing environment as well as building a solid foundation for secondary education. Primary education undergraduates are students who are in the university offering primary education as a course and are yet to be a graduate. Adeoye and Adeoye (2017) stated that our educational system has been greatly influenced by digital technologies and that undergraduate students will find it difficult to survive in the university without basic skills and knowledge of digital technology. Technologies have changed the way people gather information, carry out research, and communicate with others worldwide. Technology integration is being increasingly used in instruction to improve teaching and learning to bring about a relatively permanent change in students (Abbas, 2017). 21st-century learning is student-centered and one which supports collaboration and productivity. To facilitate teaching and learning in this 21st century learners have to learn with sophisticated technologies such as smartphones, mobile devices, and powerful internet connections. Students today do not have to take physical classes to learn as long as they have a smart device and internet access.

Some researchers asserted that application of artificial intelligence (AI) in education, the teacher can be freed from certain routine tasks and can concentrate on establishing links with students, getting to know them, and mastering skills that will accompany them on their journey towards their human development. AI is a constellation of technologies that enable machines to act with higher intelligence levels and emulate human capacity to sense, understand, and act. The ability to learn from experience and adapt over time increases these human capabilities. In other words, AI helps computers to experience their surroundings, think, and in some cases learn to act in response to the environment and its underlying circumstances. As they grow in sophistication, AI systems are finding ever wider applications across companies. AI is part of our normal lives now. Through automatic parking systems, smart sensors for taking amazing pictures, and personal assistance, we are overwhelmed by this technology. The AI program helps to explain courses and ensure that all students develop the same conceptual foundation (Elsayed *et al.*, 2015).

Traditionally, AI refers to an artificial creation of human intelligence that can understand, think, organize, interpret, or process natural language. AI is the imitation by machines and robots of processes of human intelligence such as speech and visual recognition, language translation, and virtual decision-making. Machine's ability to think and act like human beings have given AI a special place in all areas. Some researchers describe AI loosely as the ability of a computer-controlled system to perform human-like tasks. As the author points out, human qualities include mental processes such as reasoning, making meanings, generalizing, and learning from past experiences. Some researchers describe the term AI as Machine Intelligence or Computational Intelligence, which covers different sub-fields in which learning takes place and basic activities such as playing chess, proving mathematical theorems, writing poetry, and diagnosing diseases can be done. In other words, raw data, obtained by any user, is extracted by a computer, made functional, and processed before eventually being cooked data capable of fulfilling user requirements. Machine learning is software that makes predictions, finds trends, and applies certain patterns that have recently been discovered to situations not covered by their primary architecture (Schölkopf, 2015).

AI is a term used to describe a system or computer program that uses human-like cognitive features such as planning, problem-solving or rational action to perform tasks. Most popular computing technologies, such as internet search engines, digital assistants, and tagging technology for social media facial recognition, are powered by AI. Typically, AI is incorporated invisibly by computer applications that can help us improve our understanding and reasoning and communicate with others. 'Immersive' systems have become more ubiquitous, those that use technology to bring us to a separate version of reality. A new computer model called D-Wave 2X is capable of doing AI complex operations (Caplar et al., 2017). This model of computer is faster than the current computers.

2. METHODS

This study employed descriptive research of the survey type. It is a study designed to represent the interest of the participants in an accurate way. It had been considered appropriate because the descriptive research method involves the systematic collection and analysis of data collected from an outsized population that helps to explain the characteristics of population or event as they seem to support the phenomenon into account for this study without external manipulations by the researchers. This study employs a questionnaire to elicit information from the respondents. The research question was answered using frequency and percentage score while hypothesis 1 was tested using an independent sample t-test while hypothesis 2 was tested using Analysis of Variance (ANOVA) with the aid of Statistical Package for Social Science (SPSS) version 22.0. The alpha value 0.05 level of significance was used for accepting or not accepting the hypotheses.

2.1. Research Instrument

The instrument for this research is a structured questionnaire titled "Primary education student competency in the use of AI for learning in Kwara State". The questionnaire is a close-ended type, structured questionnaire was used to obtain necessary information from the respondents. The questionnaire contains two sections. Section A requires demographic information such as respondents such as gender and University proprietorship. Section B asked question on self-assessment of students' competence in the use of AI for learning by ticking the appropriate option that best describe their skills. Section B was structured using Likert scale responses modes of Highly Competent (HC), Moderately Competent (MC), Not

Skilled (NS). This was represented by a three-point rating ranging from Highly Competent (1) to Not Skilled (3) using the mean score benchmark of 2.5 for correspondent's competency.

2.2. Population, Sample, and Sampling Techniques

The population for the study consists of primary education undergraduates in Kwara state. Three Universities were purposively selected based on school ownership, the sample size for the study consists of 200 respondents. Proportional sampling techniques were used to draw the precise number of participants from each University based on their population. The simple random technique was used to select the sample of the study. The total number of students that participated in the study was 200.

2.3. Validation of the Research Instrument

The instrument was validated by experts from the Department of Adult and Primary Education. The comment and suggestions that were given led to the modification of the items in the questionnaire. All the items in the questionnaire were judged to be relevant to what is being measured thereby ensuring adequate content and face validity of the instrument. A pilot study was administered from a specific university in the Oyo State of Nigeria for the reliability of the research instrument. The research instrument was reliable at 0.84 for items on competence in the use of AI for learning at 0.05 level of significance, using Cronbach Alpha SPSS statistical tool.

2.4. Procedure for Data Collection

With a letter of introduction, we seek the permission of the sampled universities for the conduct of this study. The instrument was personally administered by the researcher in the sampled universities after taking due permission from the University Management and students involved. We administered 210 copies of the questionnaire and 200 copies were duly completed and returned. The return rate was 95%. Ethical consideration was maintained through the period of data collection. The researchers ensured that respondents were not coerced to fill out the questionnaire and respondents were allowed to participate voluntarily. Also, utmost confidentiality and secrecy of the respondents were maintained during the administration, collation, and report of research findings.

2.5. Data Analysis

The data collected and analyzed in this section represents the variables of focus for the study and background information of primary education undergraduate students that were actively involved in the study. The demographic information in which data were collected and analyzed included gender and school proprietorship which are presented in **Table 1**.

Table 1. Demographic information of the respondents.

Demographic Data		Frequency	Percentage
Gender	Male	65	32.5
	Female	135	67.5
	Total	200	100.0
Institution Type	Federal University	106	53.0
	State University	68	34.0
	Private University	26	13.0
	Total	200	100.0

3. RESULTS AND DISCUSSION

3.1. Research Question One: What is the Level of Primary Education Undergraduates' Competency in the Use of AI for Learning?

In assessing the competency of primary education undergraduates' use of AI for learning, a percentage point scale of 33.3% was adopted. Data collected were analyzed using frequency counts and percentages. As indicated in **Table 2**, higher parts of the responses were skewed towards the "not skilled" response. However, few of the participants still indicated that they were moderately competent in using AI for learning.

Table 2. Level of primary education undergraduates' competency in the use of AI for learning.

S/N	Items	Highly Competent Frequency (%)	Moderately Competent Frequency (%)	Not Skilled Frequency (%)
1	I can use Alexa to create to-do list	8 (6.7)	42 (35.0)	70 (58.3)
2	I can use Alexa to play audiobook	10 (8.3)	36 (30.0)	74 (61.7)
3	I can use Alexa to convert speech to text	16 (13.3)	72 (60.0)	32 (26.7)
4	I can use google assistance to send mail	27 (22.5)	66 (55.0)	27 (22.5)
5	I can share calendar schedule using google assistance	11 (9.2)	52 (43.3)	57 (47.5)
6	I can share calendar schedule using Alexa	8 (6.7)	42 (35.0)	70 (58.3)
7	I can use google assistance to interact with my course mate	10 (8.3)	36 (30.0)	74 (61.7)
8	I can use google assistance to learn on my own	16 (13.3)	72 (60.0)	32 (26.7)
9	I can use Siri to create to-do list	27 (22.5)	66 (55.0)	27 (22.5)
10	I can use Siri to play audiobook	11 (9.2)	52 (43.3)	57 (47.5)
11	I can use Siri to send mail	32 (26.7)	58 (48.3)	30 (25.0)
12	I can use Siri to share calendar schedule	8 (6.7)	42 (35.0)	70 (58.3)
13	I can use Siri to interact with my course mate	10 (8.3)	36 (30.0)	74 (61.7)
14	I can use Socratic to solve my home work	16 (13.3)	72 (60.0)	32 (26.7)
15	I can use Socratic to solve mathematical problem	8 (6.7)	42 (35.0)	70 (58.3)
16	I can use Socratic to search historical content	10 (8.3)	36 (30.0)	74 (61.7)
17	I can use Cortana to source for information online on my PC	16 (13.3)	72 (60.0)	32 (26.7)
18	I can interact with Replica on my day-to-day activities	27 (22.5)	66 (55.0)	27 (22.5)
19	I can use ELSA Speak to improve on my speaking skills	11 (9.2)	52 (43.3)	57 (47.5)
20	I can use Hound to send messages and provide news or accurate weather	32 (26.7)	58 (48.3)	30 (25.0)
21	I can use Parla to improve on my vocabulary	8 (6.7)	42 (35.0)	70 (58.3)
22	I can use Duolingo Bots to practice reading and writing	10 (8.3)	36 (30.0)	74 (61.7)
23	I can use Lisa to select best media to illustrate my learning	16 (13.3)	72 (60.0)	32 (26.7)
24	I can use Tetra for recording and listen to class discussion	27 (22.5)	66 (55.0)	27 (22.5)
25	I can use Astro to interact with my email inbox efficiently	11 (9.2)	52 (43.3)	57 (47.5)
Cumulative Total		386 (13.5)	1188 (41.7)	1276 (44.8)

These include: using Alexa to convert speech to text; using Google Assistant to send mail, share calendar schedule and learn independently; using Siri to create a to-do list, play audiobook, and send mail; using Socratic to solve homework; using Cortana to source for information online on the PC; interacting with Replica on day-to-day activities; using ELSA Speak to improve on speaking skills; using Hound to send messages and provide news or accurate weather, and using Lisa to select the best media to illustrate learning. Cumulatively, the summary total percentage point scale of 44.8% which is the greatest among the percentage values and greater than the benchmark of 33.3% indicated that the majority of the primary education undergraduates are not skilled and incompetent in the use of AI for learning.

3.2. Hypotheses Testing

Two hypotheses were formulated and tested in this study. The results related to the hypotheses formulated for this study were shown in subsequent tables. All hypotheses were tested at a 0.05 level of significance.

- (i) Hypothesis One. There is no significant difference between male and female primary education undergraduates' competency in the use of AI for learning.

From **Table 3**, it can be deduced that there was no significant difference between male and female primary education undergraduates' competency in the use of AI for learning. This is reflected in the findings of the hypothesis tested $df (118)$, $t = .947$, $p > 0.05 = 0.345$. Thus, the hypothesis which states that "there is no significant difference between male and female university students' competency in the use of AI for learning" is accepted.

Table 3. Independent sample t-test analysis of gender difference in the primary education undergraduates' competency in the use of AI for learning.

Gender	N	X	SD	df	T	Sig. (2-tailed)	Remark
Male	37	2.34	0.303	118	0.947	0.345	Accepted
Female	83	2.28	0.306				

- (ii) Hypothesis Two. There is no significant difference in university primary education undergraduates' competency in the use of AI for learning based on university proprietorship.

Table 4 revealed the ANOVA of difference in primary education undergraduates' competency in the use of AI for learning based on university proprietorship. The result revealed that "there was no significant difference in university students' competency in the use of AI for learning based on university proprietorship" ($F_{(2,117)} = 0.261$, $p > 0.05 = 0.771$). The null hypothesis is therefore accepted.

Table 4. Analysis of variance (ANOVA) of primary education undergraduates' competency in the use of AI for learning.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.049	2	0.025	0.261	0.771
Within Groups	11.034	117	0.094		
Total	11.083	119			

3.3. Discussion of Findings

The finding of this study found that the majority of the primary education undergraduates are not skilled and incompetent in the use of AI for learning. It is believed that competency in technological innovation is dependent on the knowledge, availability, and access to technological innovations. This finding supports the earlier finding of [Popenici and Kerr \(2017\)](#) who relayed that the realm of learning in higher education presents a very different set of challenges for students, especially as the ability to explore AI solutions will potentially restructure the learning process for students. The researchers emphasized that the capability to explore AI skillfully and gain substantive knowledge through its use is wide and requires lots of technical skills which might be unavailable to many students at this time.

There was no significant difference between male and female university students' competency in the use of AI for learning. Researchers, over the years, have reported different findings as regards gender differences in technology adoption, integration, and use. These different findings indicated that gender difference issues remain inconclusive. In the light of this, this study found out that a majority of students do not have the skills to explore or use AI, their gender is not influential to their position. The researcher stressed that innovation, incorporation, and implementation of emerging technologies are highly gender-sensitive. The researchers reported that women and girls are poorly positioned to benefit from the use of AI because they have less access to specific scientific and technical education and education in general.

The finding of this study expressed that university proprietorship does not influence students' competency in the use of AI for learning. This finding is against the previous finding of [Popenici \(2017\)](#) who asserted that AI's rapid progress is compounded by de-funded universities' efforts to find practical options for funding dwindling budgets and providing state-of-the-art facilities to their institutions. The researchers stressed that more privately-owned tertiary institutions are improving their budget to be commensurate with global best practices and adopting emerging technologies for their students to explore to achieve educational goals.

4. CONCLUSION

This study concluded that students' ability to explore digital resources such as AI is dependent greatly on their access to digital technologies. A lack of these will result in a lack of use and lack of skill to use them. In line with this, stakeholders are enjoined to make efforts in making emerging technologies accessible and should allow students to explore these technologies to maximize their potential. The findings of this study have great implications on the provision of digital technologies to schools, especially to tertiary institutions. This study advocates that AI technologies need to be made available and accessible to students. The availability and accessibility to AI technologies will motivate, prioritize and encourage the students to adopt and utilize the technologies for learning to improve their academic performance, maintain interesting, engaging, interactive, and entertaining lesson experiences, and help learners gain a better learning experience. The study recommended among others that AI technologies should be made available, open, and accessible to students, to encourage them to utilize the technologies for learning to improve learners' capability towards achieving better academic performance.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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