LEVERAGING ARTIFICIAL INTELLIGENT FOR HUMAN CAPITAL DEVELOPMENT IN AFRICA TO ACHIEVE SDG-4 IN A WORLD OF UNCERTAINTIES: LECTURERS' PERSPECTIVES

BY

Alice Morenike OLAGUNJU, *University of Ibadan, Ibadan*
Oluwatosin B. ERINFOLAMI, *University of Ibadan, Ibadan*
Abduljaleel Kola LAWAL, *Emmanuel Alayande University of Education, Oyo, Nigeria*
Odunola Lovelynn Boluwatife MOGBEYITEREN, *Emmanuel Alayande University of Education, Oyo, Nigeria*
Abiodun Ezekiel ADESINA, *Emmanuel Alayande University of Education, Oyo, Oyo state Nigeria*

Corresponding Author: **Abiodun Ezekiel ADESINA**, draeadesina2015@gmail.com;
+2348030745843; *Emmanuel Alayande University of Education, Oyo, Oyo state Nigeria*

Abstract

SDG-4 specifically aims to ensure inclusive and quality education for all, Artificial Intelligence (AI) has pervasive propensity to address many of human challenges and improve human capital development in Africa. However, the perspectives of lecturers can mar or make this claim. Therefore, this study investigates leveraging AI for human capital development in Africa to achieve SDG-4 in a world of uncertainties: Lecturers' perspectives. A research question and six null hypotheses guided the study. A mixed methods research in descriptive survey design was adopted, sampled 240 lecturers from six tertiary institutions in Oyo state, Nigeria. Two validated researchers' constructed instruments were used for data collection: Leveraging Artificial Intelligent for Human Capital Development in Africa to Achieve SDG-4 in A World of Uncertainties: Lecturers' Perspectives Questionnaire (LAiHcdASLQ, R=0.83) and Interview (LAiHcdASLQ, IRR=0.71). Collected data were analysed with descriptive statistics, thematic analysis, t-test and ANOVA. The quantitative analysis revealed that the respondents have high perceptions of leveraging AI in human capital development, however, the thematic analysis signaled otherwise. There is a significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties (Mean=98.03, df=232, t=22.57, p<.05). The perception was not beclouded by gender, types of institution and academic qualifications whereas age ($F_{(3,229)}$=6.64, p<.05) and years of lecturing experience ($F_{(3,229)}$=3.37, p<.05) significantly differentiated the perceptions. Government and Non Governmental Organisations should refurbish the institutional technological infrastructures, train and re-train lecturers to engender AI leveraging for adept and proficient human capital development in Africa.

Keywords: SDG-4, Artificial Intelligence (AI), Human capital development, Lecturers' perspectives

Word count: 247

Introduction

The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. SDG-4 specifically aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Do et al., 2020; Saini et al., 2023). However, achieving this goal in Africa has been challenging due to various factors such as inadequate funding, lack of access to technology, poor infrastructure that dovetailed into poor human capital development.

Human capital development in Africa faces challenges like inadequate infrastructure, teacher shortages, and low-quality education. Healthcare services are crucial, but many African countries struggle with high disease burdens. Gender equality remains a challenge, and government policies and investments are essential for promoting human capital development. A 2024 study by Bekele et al. found that human capital development negatively affects economic sustainability, suggesting a comprehensive approach. The African Union has designated 2024 as the Year of Education, urging member states to pursue the Continental Education Strategy and Sustainable Development Goal 4. Chikwe et al. (2015) averred that research aids human capital development, ranking a country high globally, that Nigeria faces challenges like inadequate funding, equipment, awareness, and implementation of policies and programmes.

In recent years, there has been a growing interest in leveraging artificial intelligence (AI) to address some of these challenges and improve human capital development in Africa. AI has the potential to revolutionize education by providing personalized learning experiences, improving access to education, and facilitating skills development (Bulut & Voulgaris, 2018; Gentsch, 2019; Garcia-Martinez et al., 2023Olurinola, 2023; Seo et al., 2021). Despite the potential benefits of AI in education, there is limited research on its implementation in Africa. Additionally, there are concerns about the ethical and social implications of AI in education, such as bias and privacy issues which educational stakeholders might mis-perceived.

AI has the power to completely transform the human capital development process by enhancing self-efficacy, learning, hiring, productivity, and reskilling or upskilling (Acemoglu & Restrepo, 2020; Cappelli, 2019; Lee, 2018; Manyika et al., 2017; Reich, 2019; World Economic Forum, 2020). It can automate tedious tasks, cut recruitment time and costs by up to 50%, raise productivity by up to 40%, and improve work satisfaction. AI can also increase self-efficacy by

offering tailored learning experiences and immediate feedback. Additionally, it can spot skill gaps and offer chances for focused training and growth (Lee, 2018; Manyika et al., 2017; Reich, 2019). AI has the power to completely transform the hiring of human capital by automating tasks like applicant matching, resume screening, scheduling interviews, and video interviews. Research indicates that it can lessen prejudice, save time and money, and enhance candidate matching. AI may also manage talent pools, enhance video interviews, schedule interviews based on candidates' preferences and availability, and increase efficiency.

AI can significantly boost human capital productivity by automating repetitive tasks, augmenting human capabilities, and enabling efficient decision-making. Studies show it can increase productivity by up to 40%, reduce decision-making time by 50%, and provide personalized experiences (Brynjolfsson et al., 2019; Manyika et al., 2017). Additionally, AI can improve operational efficiency by up to 25%. AI has the potential to revolutionize human capital professional development by offering personalized and adaptive learning experiences, identifying skills gaps, and providing targeted training and development opportunities. Studies show it can improve learning outcomes by up to 14%, provide real-time insights, and boost self-efficacy, making it a crucial tool for professional growth.

By encouraging creativity, automating monotonous jobs, and fostering diversity in the workplace, AI can improve worker happiness. Research indicates that it can lessen stress, foster inclusivity, and boost productivity by as much as 40% (Lashinsky, 2017; Microsoft; 2018). AI can also enhance personalization and work-life balance, which will increase employee satisfaction and engagement. Artificial intelligence has the potential to boost human capital self-efficacy through the provision of tailored learning opportunities, instant feedback, and improvement identification. Research indicates that it has the potential to enhance learning outcomes by 14%, pinpoint effective skill acquisition, and offer instantaneous feedback (Basu, 2019; Education Development Center, 2019; Goyal, R., & Vishwakarma, 2020; McKinsey Global Institute, 2017; Microsoft, 2016). Gamification is another tool AI can use to enhance learning.

By recognizing new talents, delivering individualized learning opportunities, and developing customized training plans, artificial intelligence (AI) may dramatically enhance the reskilling and upskilling of human capital. According to studies, it can measure progress,

increase engagement and reskilling using gamification strategies, and improve learning outcomes by up to 14%, making people more marketable in the workforce (Amiruddin et al., 2023; Goyal & Vishwakarma, 2020; Microsoft, 2016).

Theoretically, Artificial intelligence (AI) has the potential to revolutionize human capital development in Africa, helping achieve the Sustainable Development Goal 4 (SDG-4) of quality education and lifelong learning opportunities. To effectively leverage AI for this purpose, five theoretical frameworks must be considered: Capability Approach theory by Amartya Sen in the 1980s, Albert Bandura Social Learning Theory, Lev Vygotsky Cultural-Historical Activity Theory, Jean Piaget, Glaserfeld theory of Constructivism and Okebukola and Jegede (1990) Culturo-Techno-Contextual-Approach. The Capability Approach theory emphasizes individual capabilities and freedom, while the Social Learning Theory focuses on social interactions and experiences. The Cultural-Historical Activity Theory addresses cultural and historical challenges in education, while Constructivism promotes active learning and knowledge construction. The CTCA, Culturo-Techno-Contextual-Approach emphasizes technological utilization amidst a particular culture and in a specific context of use. These frameworks can guide the effective use of AI in education in Africa, ensuring a holistic and context-specific approach to achieving the SDG-4 goals. By adopting a holistic and context-specific approach, lecturers can harness AI's potential to enhance individual capabilities, promote freedom, and enhance lifelong learning opportunities.

Empirically, recent studies have shown the potential of AI in enhancing human capital development in Africa, particularly in achieving Sustainable Development Goal 4 (SDG-4). These studies highlight the use of AI-powered chatbots in Nigerian universities, which can provide personalized feedback and help lecturers manage large class sizes (Oyelade et al., 2021). However, they also emphasize the need for teacher training and ethical guidelines for AI use in education. AI-powered assessment tools can provide objective evaluations of student learning outcomes (Akinsola et al., 2020; Ajayi et al., 2021), but they also require ethical guidelines. Furthermore, AI can improve teacher professional development in Egypt (Rizkallah et al., 2021), but it requires integration into the existing education system and ethical guidelines. These studies underscore the need for evidence-based practices and ethical guidelines to effectively leverage AI for education in Africa. McGrath et al. (2023) identify teachers' fears and scepticism about

artificial intelligence in higher education, concerns about fairness and responsibility, and lack of knowledge about artificial intelligence and resources to engage with artificial intelligence in teaching practices. Kim and Kim (2022) found that STEM teachers found AI to be beneficial in providing better scaffolding, but also raised concerns about teacher role changes and transparency in AI decisions. These findings can guide future AI integration in STEM education. On the other hand, Moura and Carvalho (2024) found low teachers' perceptions of the use of artificial intelligence in the classroom.

Gender disparities in academia, age, institution type, years of teaching experience, and academic qualifications all play a role in the integration of AI in education. Men often have more representation and advancement opportunities, while women may have less. Addressing these biases is crucial for equal opportunities in AI-driven education initiatives (Harwell, 2019; Leavy, 2020; World Economic Forum, 2020). Age also influences familiarity with technology, with younger lecturers more adept at integrating AI tools (Bui et al., 2020; Deursen et al., 2014; Livingstone et al., 2013; Selwyn & Facer, 2013). Institution types, such as research universities, community colleges, and vocational schools, can impact resources for AI-driven initiatives (Bailey et al., 2006; Hillman, 2014). Years of teaching experience can inform the integration of AI tools, but challenges may arise (Chien et al., 2015; Froyd et al 2012; Kimmons & Hall, 2019; Sheehy & Ferguson, 2018). Higher academic qualifications may correlate with expertise in specific subject areas, but ongoing training and professional development are essential for effective teaching practices.

Statement of the Problem

The problem addressed in this study is the limited research on the implementation of artificial intelligence (AI) in education in Africa, particularly in achieving Sustainable Development Goal 4 (SDG-4) on inclusive and equitable quality education. There is a growing interest in leveraging AI to address the challenges of human capital development in Africa, such as inadequate funding, lack of access to technology, and poor infrastructure. However, there are concerns about the ethical and social implications of AI in education, such as bias and privacy issues. This study aims to explore the perspectives of lecturers on the opportunities and challenges of leveraging AI for human capital development in Africa to achieve SDG-4 in a world of uncertainties. This exploration would be implicative towards effective in leveraging artificial intelligent for human

capital development in Africa to achieve SDG-4 in a world of uncertainties. Do the lecturers' socio-academic variables (gender, age, types of institution, years of lecturing experiences and academic qualifications) influence their perceptions of leveraging AI for human capital development in Africa to achieve SDG-4 in a world of uncertainties? This study unravels this.

Objectives of the Study

The objectives of this study on Leveraging Artificial Intelligent for Human Capital Development in Africa to Achieve SDG-4 in a World of Uncertainties: Lecturers' Perspectives are; to:

1. investigate the current level of lecturers' perceptions of leveraging AI for human capital development in Africa to achieve SDG-4 in a world of uncertainties.

2. examine the current level of lecturers' perceptions of leveraging AI for human capital recruitment in Africa to achieve SDG-4 in a world of uncertainties.

3. assess the current level of lecturers' perceptions of leveraging AI for human capital productivity in Africa to achieve SDG-4 in a world of uncertainties.

4. study the current level of lecturers' perceptions of leveraging AI for human capital professional development in Africa to achieve SDG-4 in a world of uncertainties,

5. provide the current level of lecturers' perceptions of leveraging AI for human capital job satisfaction in Africa to achieve SDG-4 in a world of uncertainties,

6. investigate the current level of lecturers' perceptions of leveraging AI for human capital self-efficacy in Africa to achieve SDG-4 in a world of uncertainties.

7, investigate the current level of lecturers' perceptions of leveraging AI for human capital reskilling and upskilling in Africa to achieve SDG-4 in a world of uncertainties.

Research Question

The research question for the study on Leveraging Artificial Intelligent for Human Capital Development in Africa to Achieve SDG-4 in a World of Uncertainties: Lecturers' Perspectives is:

Question One: What are the levels of lecturers' perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling?

Hypotheses

Ho1: There is no significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties

Ho2: There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on gender

Ho3: There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age

Ho4: There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on types of institution

Ho5: There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience

Ho6: There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on academic qualification

Methodology

Research design

Descriptive survey research design in a mixed research methods of quantitative and qualitative approaches in concurrent triangulation was adopted for this study. It investigated the lecturers' perspectives of leveraging on artificial intelligent for human capital development in Africa to achieve SDG-4 in a world of uncertainties using questionnaire to collect the quantitative data while in-depth interview was used to collect the qualitative data.

Population of the study

The population consists of all lecturers in tertiary institutions in Oyo state, Nigeria.

Sample and sampling techniques

Cluster random sampling technique was adopted to select the participants from the clusters of public and private as well as that of the state and federal tertiary institutions in Oyo state. The

sample for the study comprised of 240 lecturers from six selected tertiary institutions in Oyo state, Nigeria. The questionnaire was administered to the lecturers in their respective institutions.

Research Instruments

Two researchers' constructed scales titled: Leveraging Artificial Intelligent for Human Capital Development in Africa to Achieve SDG-4 in A World of Uncertainties: Lecturers' Perspectives Questionnaire (LAiHcdASLQ) and Leveraging Artificial Intelligent for Human Capital Development in Africa to Achieve SDG-4 in A World of Uncertainties: Lecturers' Perspectives Interview (LAiHcdASLI) were used for data collection. The scales were constructed from seven universe of constructs: Human capital production, Human capital recruitment, Human capital productivity, Human capital professional development, Human capital job satisfaction, Human capital self-efficacy and needs for Human capital reskilling and upskilling.

LAiHcdASLQ is made up of two sections, Section A and Section B. **Section A** - This consisted of the personal data of the subjects containing the following: Gender, Age, Type of institution, Years of Teaching Experience, and Highest academic qualification. Section B has twenty-eight items to collect relevant information on lecturer perspectives of leveraging Artificial intelligence for Human Capital Development in Africa to Achieve SDG-4 in A World Of Uncertainties. The items contained equal numbers of positive and negative items. The items were placed on a 4-point likert type ordinal scale ranging from Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, and Strongly Disagree (SD) 1 and the reverse for the negative items.

LAiHcdASLQ was subjected to face and construct validity by giving copies to experts in education, educational evaluation and science education for their comments, criticism and suggestions. These experts were asked to determine its suitability for the target population in terms of clarity, breath and language. The initial draft containing 40 items were reduced to 25 in the final draft by the experts. The reliability coefficient of the instrument was determined using Cronbach Alpha which yielded a value of 0.83.

LAiHcdASLI was a 14-item interview scale. It was also constructed based on the seven universe of constructs of Human capital production, Human capital recruitment, Human capital productivity, Human capital professional development, Human capital job satisfaction, Human

capital self-efficacy and needs for Human capital reskilling and upskilling. LAiHcdASLI was given to psychometricians for construct validity and the items were pruned to seven. The seven item LAiHcdASLI was administered on 20 lecturers outside the scope of the study and their responces subjected to Fliess Kappa reliability which yielded a value of 0.71.

Procedure for data collection

The researcher proceeded to obtain permission from the Head of the institutions of the participating tertiary institutions. The lecturers were informed about the purpose of the research and what it entails. Thus, the researcher along with the trained research assistants numbered the instruments before administering them in all the sampled institutions. The Google form of the online Questionnaire and the Interview scales were also administered. The administration and collection of the questionnaire covered a period of about two weeks in all the selected institutions in Oyo state, Nigeria.

Data analysis

Data were analyzed using descriptive statistics of frequency counts and percentage for the socio-demographic variables of the study. Mean, standard deviation and thematic analysis to answer the research questions. T-test and ANOVA were used to test the hypotheses at 0.05 level of significance. Bonferroni Posthoc test was conducted when there was significant difference in Analysis of Variance to determine the direction of differences.

Results

Table 1: Respondents Socio-demographic Variables of the Study

Variable	Frequency	Percentage (%)
Gender		
Male	162	69.5
Female	71	30.5
Total	233	100.0
Age Group		
20-29 Years	32	13.7
30-39 Years	82	35.2
40-49 Years	98	42.1
50 Years & Above	21	9.0
Total	233	100.0
Types of Institution		
Monotecnic	11	4.7
Polytecnic	28	12.0
College of Education	101	43.3

University	93	39.9	
Total	233	100.0	
Years of Lecturing Experience			
1-9 Years	55	23.6	
10-19 Years	100	42.9	
20-29 Years	72	30.9	
30 Years & Above	6	2.6	
Total	233	100.0	
Academic Qualification			
First Degree	26	11.2	
Second Degree	124	53.2	
PhD	83	35.6	
Total	233	100.0	

Table 1 indicates that there are 162 (69.5%) male and 71 (30.5%) female, 32 (13.7%) 20-29 years, 82 (35.2%) 30-39 years, 98 (42.1%) 40-49 years and 21 (9.0%) 50 years and above in the distribution. Also, there are 11 (4.7%), 28 (12.0%), 101 (43.3%) and 93 (39.9%) respondents from the Monotechnic, Polytechnic, Colleges of Education and Universities respectively. Furthermore, there are 55 (23.6%) 1-9 years, 100 (42.9%) 10-19 years, 72 (30.9%) 20-29 years and 6 (2.6%) 30 years and above of lecturing experience., and finally, there are 26 (11.2%) fisrt degree holders, 124 (53.2) second degree holders and 83 (35.6%) PhD holders in the sample for the study. In all, there are more male gender, 40-49 years of age, colleges of education lecturers, 10-19 years of lecturing experience and more of master degree holders in the distribution than others.

Answers to Research Questions

Question One: What are the levels of lecturers' perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling?

Table 2: lecturers' perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling

lecturers' perceptions of leveraging AI	N	Mean	Std. Deviation
Human Capital Production	233	14.4506	2.50489
Human Capital Recruitment	233	13.7854	2.74747
Human Capital Productivity	233	14.1545	2.76402
Human Capital Professional Development	233	14.1545	2.76402
Human Capital Job_satisfaction	233	13.6524	3.11755

HC_Job Self_efficacy				233	14.0944	4.27196	
Human Capital Job Upskilling and Reskilling				233	13.7382	2.85650	

From Table 2, the mean scores of 14.45 (2.50), 13.79 (2.75), 14.15 (2.76), 14.15 (2.76), 13.65 (3.12), 14.09 (4.27) and 13.74 (2.86) for human capital production, recruitment, productivity, professional development, job satisfaction, job self-efficacy and human capital job upskilling and reskilling respectively in lecturers' perceptions of leveraging AI in human capital development. The quantitative analysis of mean and standard deviation revealed that the respondents have high perceptions leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling. The qualitative thematic analysis is presented in Table 3.

Table 3: Thematic Analysis of lecturers' perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling

Interviewees	Human Capital Production	Human Capital Recruitment	Human Capital Productivity	Human Capital Professional Development	Human Capital Job satisfaction	Human Capital Job Self efficacy	Human Capital Job Upskilling and Reskilling
Respondent I	I don't know	Unlikely	I don't think so	Not likely	Never	Not really	I don't know
Respondent II	Fairly	fairly	Not really	Not really	No impact	No impact	High tendency
Respondent III	Fairly	Partially	No	No	No	No	no
Respondent IV	No idea	No idea	No idea	No idea	No idea	No idea	Probably
Respondent V	Fairly	Fairly	Significantly	fairly	Fairly	Significantly	Highly needed
Respondent VI	Highly impactful	High impact	Very impactful	Highly impactful	Positive impact	Very impactful	Highly essential
Respondent VII	Very helpful	Helpful	Highly helpful	Effective	Helpful	Very helpful	Very important
Respondent VIII	Low effect	Unlikely	Not sure	Not likely	No effect	Not really	I don't think so

Respondent IX	Highly essential	Essential	Essential	Essential	Essential	Essential	Highly essential
Respondent X	Not needed	Not needed	Not needed	Not needed	Not needed	Not needed	Not needed

From Table 3, it was discovered that many of the respondents were not familiar with the construct of Artificial Intelligence (AI). Many of the respondents perceived AI as rocket science that can never impact the leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling in Africa. Only very few of the interviewees that positively perceived leveraging artificial intelligent for human capital development in Africa to achieve SDG-4 in a world of uncertainties.

Hypotheses Testing

Ho1: "There is no significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties"

Table 4: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties

lecturers' perceptions of leveraging AI	N	Mean	SD	Df	t	Remark
Human Capital Development	233	98.03	15.58	232	22.57	*S

Table 4 indicates that there is a significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties (N=233, Mean=98.03, df=232, t=22.57, p<.05). Therefore, Ho1 is not accepted.

Ho2: "There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on gender"

Table 5: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on gender

	Lecturer Gender	N	Mean	Std. D.	df	T	Sig.	Remarks
HC_Lecturer_Perception	Male	162	98.80	14.61		1.14	.258	NS
	Female	71	96.28	17.58	231			

From Table 5, there is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on gender (t=1.14, df=231, p>.05). Therefore, Ho2 is accepted.

Ho3: "There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age"

Table 6.0: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4503.708	3	1501.236	6.638	.000
Within Groups	51787.082	229	226.144		
Total	56290.790	232			

Table 6.0 reveals that there is a significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age ($F_{(3,229)}$=6.64, p<.05). Therefore, Ho3 is not accepted. To know the direction of the difference, a posthoc test was reported in Table 6.1

Table 6.1: Posthoc Test of Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age

		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
(I) Lecturer Age	(J) Lecturer Age				Lower Bound	Upper Bound
20-29years	30-39years	2.05107	3.13447	1.000	-6.2909	10.3930
	40-49years	10.57844*	3.06180	.004	2.4299	18.7270
	50 years & above	7.12946	4.22325	.556	-4.1102	18.3691

 *. The mean difference is significant at the 0.05 level.

From Table 6.1, the significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age was as a result of differences in mean scores of lecturers with 20-29 years of age whose mean was greater than those of 30-39 years followed by those with 50 years and above while lecturers with 40-49 years of age had the least mean perception scores of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on age.

Ho4: "There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on types of institution"

Table 7: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on types of institution

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1097.702	3	365.901	1.518	.211
Within Groups	55193.088	229	241.018		
Total	56290.790	232			

Table 7 reveals that there is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on types of institution ($F_{(3,229)}$=1.52, p>.05). Therefore, Ho4 was accepted.

Ho5: "There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience"

Table 8.0: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2379.075	3	793.025	3.369	.019
Within Groups	53911.715	229	235.422		
Total	56290.790	232			

From Table 8.0, it was revealed that there is a significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience ($F_{(3,229)}$=3.37, p<.05). Therefore, Ho5 is not accepted. To know the direction of the difference, a posthoc test was reported in Table 8.1

Table 8.1: Posthoc Test of Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience

(I) Years of	(J) Years of	Mean	Std.	Sig.	95% Confidence Interval

Lecturing Experience	Lecturing Experience	Difference (I-J)	Error		Lower Bound	Upper Bound
20-29yrs	1-9yrs	1.75152	2.74776	1.000	-5.5613	9.0643
	10-19yrs	5.83333	2.37149	.088	-.4781	12.1448
	30yrs & above	15.00000	6.51972	.134	-2.3514	32.3514

From Table 8.1, the significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on years of lecturing experience was as a result of differences in mean scores of lecturers with 20-29 years of lecturing experience whose mean was greater than those of 1-9 years followed by those with 10-19years while lecturers with 30 years and above years of teaching experience had the least mean perception scores of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties.

Ho6: "There is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on academic qualification"

Table 9: Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG based on academic qualification

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	498.373	3	166.124	.682	.564
Within Groups	55792.416	229	243.635		
Total	56290.790	232			

Table 9 indicates that there is no significant difference in lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties based on academic qualification ($F_{(3,229)}$=.682, p>.05). Therefore, Ho6 was accepted.

Discussion

From the answered research questions, the quantitative analysis of mean and standard deviation revealed that the respondents have high perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling. However, the qualitative data analysis revealed that

majority of the respondents were not familiar with leveraging artificial intelligent for human capital development in Africa to achieve SDG-4 in a world of uncertainties. It could be averred that many lecturers are still skeptical, fearful and doubtful about technology integration like AI in education. This qualitative results of lecturers' low perception of leveraging for human capital development in Africa to achieve SDG-4 in a world of uncertainties find supports in Moura and Carvalho (2024) that found low teachers' perceptions of the use of artificial intelligence in the classroom. The quantitative aspect of the results that indicates lecturers' high perspectives of of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling fall in tandem with Kim and Kim (2022) that STEM teachers found AI to be beneficial in providing better scaffolding, but also raised concerns about teacher role changes and transparency in AI decisions.

The tested hypotheses revealed that there is a significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa. This means that the lecturers have significant perceptions of leveraging AI in human capital development, recruitments, productivity, professional development, job satisfaction, self-efficacy and human capital reskilling and upskilling. The significant lecturers' perception of AI can be as a result of the ubiquitous roles technology plays in the global society in which human capital development cannot be left out. This result finds supports in Akinsola et al. (2020); Ajayi et al. (2021), Kim and Kim (2022) that teachers perceived AI as highly impactful in education. This finding contrast the reports of McGrath et al. (2023) Moura and Carvalho (2024) found low teachers' perceptions of the use of artificial intelligence in the classroom

Moreover, the lecturers' significant perceptions of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa is not beclouded by gender, types of institution and the lecturers' academic qualifications. This can be explained on the pervasiveness of Artificial Intelligence (AI) to break the gender dichotomy, the institutional types and academic qualification disparities. However, the lecturers' perceptions of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa were influenced by their age and years of lecturing experience. The younger lecturers perceived

better leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa than the older lecturers, this is explained on the basis of 21st century that is pivoted by technology in the 5th industrial revolution is more resident with the Neticen generation of the younger lecturers. This result is buttressed by Bui et al. (2020), Deursen et al. (2014) that younger individuals are more adept with technology like AI than the older individuals. In the same vein, the lecturers with lower years of teaching experience have better perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa than those with longer years of lecturing experience. This follows the slogan that it is easier to teach younger dogs new tricks than the older ones.

Conclusion

From the findings of the study, it could be concluded that:

1. Many lecturers have low perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties in Africa;

2. There is a significant lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties;

3. Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties is not beclouded by gender, types of institution and acacdem,ic qualification, and

4. Lecturers' perception of leveraging AI for human capital development in Africa to achieve SDG-4 in world of uncertainties is significantly influenced by age and years of lecturing experience in favour of the younger lecturers.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Government and Institutional management should train and retain the lecturers in tertiary institutions on emerging technologies most especially on Artificial Intelligence (AI) that is making major impacts in all ramifications of human endeavours in the whole world. This would avail the lecturers a better perception of AI and its leveraging in human capital development;

2. Government and Non Governmental Organisations should refurbish the institutional technological infrastructures to engender practical skills, creativity and innovations in AI by lecturers of tertiary institutions. With adequate technological infrastructures in institutions, lecturers are bound to improve their perception of emerging technologies like AI which invariably would engender better service delivery by the lecturers and higher human capital development in Africa.,

3. Institutional management with academic unions like Academic Staff Union of Universities (ASUU), Colleges of Education Academic Staff Union (COEASU) and Academic Staff Union of Polytechnic (ASUP) should organize conferences, seminars, workshop and symposia on effective leveraging of AI in human capital development in Africa.

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