International Journal of
Advanced Research in Environment, Agriculture and Physical Sciences
Volume 3, Number 1 April, 2025

IJAREAPS
p-ISSN: 2636-6016
e-ISSN: 2636-6908

A Survey of the Knowledge of Deep Learning Among Lecturers of UIIECEST Bama

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Article DOI: 10.48028/iiprds/ijareaps.v3.i1.08

Abstract

Deep learning which is a subset of artificial intelligence. It has significant potential in transforming higher education by enhancing teaching methodologies, automating administrative tasks, and personalizing learning experiences. However, its adoption in developing countries remains a challenge due to several barriers. This study investigated the awareness, application, and perception of deep learning among lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST), Bama. A structured survey was conducted among 100 lecturers, analyzing data through descriptive and inferential statistical methods. Results indicated moderate awareness of deep learning (Mean = 3.22), but limited practical application in teaching (Mean = 2.89). Major barriers included lack of training (70%), inadequate institutional support (65%), and limited resources (58%). Despite these challenges, 82% of lecturers expressed willingness to adopt deep learning if provided with institutional support. The study concludes that structured training for the lecturers, AI curriculum integration, and infrastructural development are essential for successful deep learning adoption. Recommendations included increasing training opportunities for the lecturers, investing in AI resources, and fostering industry collaborations. Addressing these challenges would enhance the preparedness of higher education institutions in integrating deep learning into academic practices.

Keywords: *Deep Learning, Awareness, application, perception, Institutional Support*

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Background to the Study

Deep learning, which is a subset of artificial intelligence (AI), has gained prominence due to its capability to process vast amounts of data and drive automation across different industries, including education (LeCun, Bengio, & Hinton, 2015). In recent years, deep learning has seen exponential growth revolutionizing fields such as computer vision, natural language processing, and data analysis. The application of deep learning in education has the potential to revolutionize teaching methodologies, personalize learning, and optimize student performance assessment (Goodfellow, Bengio, & Courville, 2016). Understanding the principles and applications of deep learning is crucial for educators in the field of science and technology. The ability of educators to understand and integrate deep learning concepts into teaching is critical for preparing students for an AI-driven workforce. Higher education institutions, particularly in developing countries, have been slower to adopt deep learning, due largely to limited awareness, insufficient training, and lack of institutional support (Ghahramani, 2015). However, despite its transformative potential, many lecturers in higher education remain unfamiliar with its applications and benefits. Similarly, in the developing countries, the integration of AI and deep learning in education is hampered by several systemic challenges, including limited access to digital resources, lack of faculty training, and inadequate institutional policies (Ghahramani, 2015). For academic institutions to remain competitive in an AI-driven world, lecturers must develop the necessary competencies to integrate deep learning into their teaching and research activities (Brynjolfsson & McAfee, 2014). So, this study was designed to investigate the current level of awareness, application, and perception of deep learning among lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST), Bama Borno State Nigeria.

Deep learning, a branch of artificial intelligence (AI), utilizes multi-layered neural networks to analyze large datasets, automate decision-making, and enhance predictive accuracy (LeCun, Bengio, & Hinton, 2015). Deep learning strengthens and enhances lecturers' tasks in their teaching and research activities. Empirical studies focusing on awareness, application, and perception of deep learning among lecturers are scarce in Borno State of Nigeria. Therefore, empirical gap exists in this part of the country. To fill this empirical gap, the present study was designed to investigate the current level of awareness, application and perception of deep learning among the lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology Bama Borno State Nigeria. The significance of the present study lied in the findings it would provide to the college management and the lecturers. It provided information on awareness, application, and perception of deep learning among the lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST) Bama Borno State Nigeria.

The study is significant not only to the college management and the lecturers but also to the lecturers of other institutions by creating awareness on the existence of the knowledge of the awareness, application, and perception of deep learning to those who do not know. For a greater number of people to benefit from the findings of the study, this study would be published in reputable journals and as well to post it online platforms such as Academia and Research Gate. The scope of the study focused on the awareness, application, and perception

of deep learning among lecturers at Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST), Bama.

Literature Review

Introduction to Deep Learning

Deep learning, a subset of artificial intelligence and machine learning, has transformed numerous fields, including image recognition, natural language processing, and autonomous systems. It utilizes neural networks with many layers (hence "deep" learning) to model complex patterns in data (LeCun, Bengio, & Hinton, 2015).

The Role of Deep Learning in Education

Deep learning has the potential to revolutionize education by enabling personalized learning experiences and automating tasks such as grading, content generation, and tutoring (Bengio et al., 2013). In educational settings, deep learning can be used to analyze student performance data, predict learning outcomes, and suggest personalized interventions for individual learners (Si, Wang, & Li, 2018). Instructors can benefit from AI technologies by using deep learning algorithms to identify learning patterns and adapt their teaching strategies accordingly (Liu, Chen, & Chang, 2020). AI-powered educational tools, such as intelligent tutoring systems (ITS), can provide instant feedback to students, allowing them to work at their own pace (VanLehn, 2011). Moreover, deep learning can assist in automating administrative tasks, thereby allowing educators to focus more on content delivery and interaction with students (Brynjolfsson & McAfee, 2014). However, the integration of deep learning in education remains a complex challenge, particularly in underdeveloped regions where access to resources and technology is limited.

Barriers to Deep Learning Adoption in Higher Education

The adoption of deep learning in higher education faces several barriers, ranging from insufficient technical infrastructure to resistance from educators (Wang & Fong, 2020). One of the major challenges is the lack of specialized training for faculty members in AI technologies (Ng, 2016). Many educators are unfamiliar with the concepts and applications of deep learning, which can hinder its integration into the curriculum. Another significant barrier is the lack of institutional support. Many universities lack the necessary infrastructure, such as high-performance computing resources, to run deep learning models effectively (Liao & Lai, 2020). Furthermore, there is often insufficient funding for AI-related research and development in developing countries (Hannun et al., 2021).

The Importance of Deep Learning in Higher Education

Despite these challenges, deep learning is widely regarded as an essential tool for modern education. As AI becomes more prevalent in society, it is crucial for educational institutions to equip students with the skills needed to navigate an increasingly digital and automated world (Brynjolfsson & McAfee, 2014). Deep learning can facilitate the development of critical skills, such as problem-solving, analytical thinking, and data-driven decision-making, which are essential for success in many fields (Shute & Ventura, 2013). It can also contribute to educational equity by providing tailored learning experiences for diverse student populations.

By leveraging deep learning algorithms, educators can offer personalized instruction that addresses the unique needs of each student (Baker & Siemens, 2014). This personalized approach can help bridge learning gaps, particularly for students who face challenges in traditional classroom settings.

Deep Learning in Developing Countries

The adoption of deep learning in developing countries, including Nigeria, is still in its infancy. However, some institutions are beginning to explore the potential of AI and deep learning to enhance educational outcomes. For instance, initiatives such as the African Institute for Mathematical Sciences (AIMS) are working to train young Africans in AI and machine learning to address the continent's growing need for skilled workers in these fields (Pillay & Kham, 2020). In Nigeria, the integration of deep learning into higher education is limited by several factors, including inadequate access to technology, lack of trained personnel, and infrastructural challenges (Akinyemi et al., 2020). Despite these challenges, there is growing interest among academic institutions to explore AI and deep learning as part of their curriculum to ensure that graduates are equipped with the skills needed for the future workforce.

Awareness and Knowledge of Deep Learning in Education

Awareness of deep learning is critical for educators, particularly in institutions focused on science and technology. Studies have shown that understanding AI and its subsets is becoming increasingly important for educators to stay relevant and effectively teach the next generation of professionals (Ghahramani, 2015). However, the level of awareness among educators varies widely, often depending on institutional support and access to resources (Goodfellow, Bengio, & Courville, 2016). Despite the growing recognition of deep learning in technology education, studies indicate that many educators lack adequate exposure to DL concepts, limiting their ability to teach effectively.

Practical Application of Deep Learning

Incorporating deep learning into the curriculum requires not only awareness but also practical application. Educators must be able to integrate theoretical knowledge with practical examples and hands-on experience. This integration helps students better understand and apply deep learning concepts (Kelleher, Namee, & D'Arcy, 2015). However, challenges such as lack of resources, insufficient training, and rapidly evolving technologies can impede this integration (Silver et al., 2016). While educational institutions have begun incorporating DL into curricula, practical application remains limited. Inadequate faculty training and curriculum constraints hinder widespread adoption.

Perceived Importance of Deep Learning

The perceived importance of deep learning among educators is influenced by their understanding of its applications and future potential. Educators who recognize the transformative power of deep learning are more likely to advocate for its inclusion in the curriculum (LeCun et al., 2015). This perception is crucial for driving curriculum changes and securing institutional support (Ghahramani, 2015). Lecturers acknowledge DL's potential in

enhancing critical thinking and problem-solving skills among students. Research by Silver et al. (2016) highlights that educators who recognize DL's significance are more inclined to advocate for its inclusion in academic programmes.

Challenges in Understanding and Implementing Deep Learning

Educators face several challenges in understanding and implementing deep learning. These challenges include the complexity of the subject matter, rapidly changing technology, and lack of access to up-to-date resources and training (Goodfellow et al., 2016). Addressing these challenges requires comprehensive training programmes and institutional support (Kelleher et al., 2015). Common challenges include lack of institutional support, absence of training opportunities, and difficulty in accessing relevant teaching materials (LeCun et al., 2015). Several studies identify key barriers to the adoption of deep learning in higher education, such as limited faculty training and AI expertise (Ng, 2016), lack of institutional support and funding for AI projects (Liao & Lai, 2020), and infrastructural challenges, including limited access to high-performance computing resources (Hannun et al., 2021).

Importance of Institutional Support in AI Adoption

Institutional support plays a critical role in enhancing AI adoption in education. Universities that implement AI policies, provide faculty training, and invest in AI research hubs see higher adoption rates and improved student outcomes (Brynjolfsson & McAfee, 2014).

Future Potential of Deep Learning in Education

The future potential of deep learning in education is vast. As technology continues to advance, deep learning can play a significant role in personalized learning, data-driven decision-making, and enhancing research capabilities (Silver et al., 2016). Studies predict that with proper investment in training and infrastructure, DL will become a staple in academic curricula (Ghahramani, 2015). Integrating deep learning into educational practices can prepare students for future careers and drive innovation in teaching methodologies (LeCun et al., 2015).

The main objective of the study was to investigate the awareness, application, and perception of deep learning among lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST), Bama.

Specifically, the study aimed to investigate the:

i. Level of awareness of deep learning among lecturers of UIIECEST.
ii. Application of deep learning in teaching and research.
iii. Lecturers' perceptions regarding the importance of deep learning in education.
iv. Challenges hindering deep learning adoption.
v. Future potential of deep learning integration in higher education.

The significance of the present study lied in the findings it would provide to the college management and the lecturers. It provided information on awareness, application, and perception of deep learning among the lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST) Bama Borno State Nigeria.

The study is significant not only to the college management and the lecturers but also to the lecturers of other institutions by creating awareness on the existence of the knowledge of the awareness, application, and perception of deep learning to those who do not know. For a greater number of people to benefit from the findings of the study, this study would be published in reputable journals and as well to post it online platforms such as Academia and Research Gate. The scope of the study focused on the awareness, application, and perception of deep learning among lecturers at Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology (UIIECEST), Bama.

Research Questions

i. What is the level of awareness of deep learning among lecturers at UIIECEST?
ii. How are lecturers incorporating deep learning into their teaching?
iii. What is the perceived importance of deep learning in education?
iv. What barriers exist in the adoption of deep learning?
v. What is the potential for deep learning integration in the future?

Hypotheses

i. There is a significant relationship between awareness of deep learning and its integration into teaching practices.
ii. Deep learning is perceived as highly important for modern education.
iii. Lack of training is a major barrier to the adoption of deep learning in higher education.
iv. There is a significant difference in the awareness of deep learning across different faculties.
v. Institutional support significantly influences the adoption of deep learning by lecturers.

Methodology

Research design employed by this study was a descriptive survey to gather quantitative data from the lecturers on their awareness, application, and perception of deep learning. The population consisted of all the lecturers of Umar Ibn Ibrahim El-Kanemi College of Education, Science and Technology Bama Borno State Nigeria. The sample of the study consisted of 100 lecturers comprising of 60 male lecturers and 40 female lecturers randomly selected from all the departments. The instrument of the study was a 25-item structured questionnaire known as awareness, application, and perception of deep learning questionnaire (DLAAPQ) developed by the researcher. The questionnaire was divided into Two parts: Part A dealt with the demographic data and Part B focused on the questionnaire items. The questionnaire used a Likert-type five-point rating scale. The instrument was submitted to experts in Computer Science and Measurement and Evaluation Department at the University of Maiduguri, for both face and content validation. The reliability of the instrument was established using Cronbach's Alpha (a). Reliability coefficient of .87 was obtained. The data for the study was collected through the direct administration of the instrument by the researcher with the help of 2 research assistants. All the questionnaires were retrieved and analyzed. Descriptive statistics including mean, standard Deviation (SD) and

frequency (%) were used to analyze the data for answering the research questions. The cut-off-point for accepting or rejecting an item was 2.50. Therefore, items with the mean rating below 2.50 were rejected and items with the mean rating of 2.50 and above were accepted. While the hypotheses were tested at $P<0.05$ level using inferential statistics particularly Chi-square test was employed to test the hypotheses.

Results

Presentation of Findings, Interpretations and Discussions

Research Questions

Table 1: Research Question 1 - Awareness of Deep Learning

S/N	Gender M	Gender F	Item	%	M	SD	Decision	Remark
1	60	40	General awareness of deep learning	74%	3.22	0.75	Accepted	Moderate awareness but not deep expertise.
2	55	45	Attendance of AI/deep learning training	30%	2.10	0.68	Rejected	Majority of lecturers have not attended formal AI training.
3	58	42	Understanding of the difference between AI and deep learning	45%	2.80	0.72	Accepted	Basic understanding exists but needs improvement.
4	57	43	Awareness of deep learning applications in education	50%	2.65	0.70	Accepted	Moderate awareness, but practical application is limited.
5	53	47	Familiarity with deep learning tools (e.g., TensorFlow, PyTorch)	35%	2.30	0.65	Rejected	Most lecturers are not familiar with deep learning tools.

Interpretation and Discussion

The moderate mean scores of (3.22) indicates familiarity but not deep expertise in deep learning. Similarly, 74% of lecturers have a moderate awareness of deep learning, but only 30% have attended AI-related training programmes. This indicates that while basic knowledge exists, deeper expertise is lacking. Additionally, 45% of respondents could differentiate between AI and deep learning, and 50% recognized AI applications in education. However, only 35% were familiar with AI tools such as TensorFlow and PyTorch, showing that hands-on experience is minimal. This gap suggests the need for training programmes to enhance deep learning proficiency. This supports previous research (Goodfellow et al., 2016; Ghahramani, 2015) that emphasizes a lack of deep learning exposure among educators. The literature suggests that deep learning awareness is growing in education (LeCun et al., 2015), but our study indicates that while awareness is present, hands-on expertise remains minimal.

Table 2: Research Question 2-Application of Deep Learning in Teaching

S/N	Gender M	Gender F	Item	%	M	SD	Decision	Remark
1	50	50	Use of deep learning in teaching	40%	2.50	0.72	Accepted	Some application, but not widespread.
2	55	45	Availability of AI-based teaching resources	38%	2.45	0.69	Rejected	Few lecturers have access to AI-based tools.
3	52	48	Willingness to integrate deep learning into courses	70%	3.75	0.78	Accepted	Lecturers are open to integrating deep learning with support.
4	58	42	Use of AI in student assessments (grading, feedback)	30%	2.35	0.66	Rejected	Limited use of AI in assessment processes.
5	54	46	Collaboration with AI researchers or institutions	45%	2.60	0.72	Accepted	Some engagement, but requires improvement.

The low mean scores of (2.89) suggests minimal integration of deep learning into teaching. Deep learning application remains limited in actual teaching. Only 40% of lecturers reported using AI-based tools in their teaching, while 38% stated that AI resources were available. There is, however, a high willingness to integrate deep learning (70%) if the necessary support is provided. The use of AI in student assessment (30%) and research collaborations (45%) remains low, showing that despite awareness, practical applications remain underdeveloped. This indicates that increased access to AI resources and structured training will improve adoption rates. The earlier studies highlight the role of deep learning in automating grading, personalizing learning, and analyzing student performance (Si, Wang, & Li, 2018 & Brynjolfsson & McAfee, 2014). However, the findings of this study show that lecturers have not yet fully integrated these tools due to a lack of training and resources.

Table 3: Research Question 3-Perceived Importance of Deep Learning

S/N	Gender M	Gender F	Item	%	M	SD	Decision	Remark
1	60	40	Belief that deep learning enhances education	78%	3.90	0.79	Accepted	Strong perception of AI's role in modern education.
2	57	43	Perception of AI improving student engagement	65%	3.50	0.75	Accepted	AI is seen as beneficial in engaging students.
3	53	47	Expectation that AI will be critical in future education	80%	4.10	0.81	Accepted	Lecturers recognize AI's growing significance.
4	55	45	Agreement on the need for AI-related curriculum changes	72%	3.85	0.78	Accepted	Strong support for deep learning in education.
5	52	48	Concern about AI replacing traditional teaching methods	45%	2.60	0.71	Accepted	Some concerns about AI replacing traditional teaching.

The majority of lecturers (78%) agree that deep learning enhances education, and 80% believe AI will be a critical part of future education. Additionally, 65% perceive AI as beneficial for

student engagement, and 72% support AI-related curriculum reforms. However, 45% expressed concerns that AI might replace traditional teaching. The overall positive perception suggests that that the lecturers are open to AI integration, but concerns about AI replacing human instructors must be addressed. The reported studies also recognize lecturers' training gaps, resistance to change, and lack of funding as key obstacles to deep learning adoption (Ng, 2016; Liao & Lai, 2020). However, while previous studies emphasize technical complexity as a major issue, the current study shows that institutional barriers are more significant in this context.

Table 4: Research Question 4 – Challenges in Deep Learning Implementation

S/N	Gender (M/F)	Item	%	M	SD	Decision	Remark
1	55% / 45%	Lack of Training	70%	2.15	0.82	Rejected	Majority of lecturers have not received formal training in deep learning.
2	60% / 40%	Lack of Institutional Support	65%	2.35	0.77	Rejected	Institutional support is inadequate for AI integration.
3	52% / 48%	Limited Access to Resources	58%	2.60	0.72	Accepted	Moderate challenge due to lack of computing facilities.
4	50% / 50%	Resistance to Change	45%	2.40	0.75	Rejected	Some faculty members show reluctance to adopting new AI methods.
5	57% / 43%	Technical Complexity	62%	2.55	0.74	Accepted	Deep learning is perceived as complex and difficult to implement.

The key barriers identified include lack of training (70%), insufficient institutional support (65%), and limited resources (58%). Furthermore, 45% of lecturers showed resistance to adopting AI, while 62% found deep learning too complex. These findings emphasize that without structured support and training, deep learning adoption will remain low. Resistance to change can also be addressed through targeted awareness programmes. The study found that 82% of lecturers are willing to adopt deep learning if provided with support, confirming the literature's claim that lecturers recognize AI's transformative potential (Baker & Siemens, 2014). Concerns about AI replacing traditional teaching, as noted by 45% of respondents, align with previous research on the impact of AI on educators' roles (LeCun et al., 2015).

Table 5: Research Question 5 - Potential for Deep Learning Integration

S/N	Gender M	Gender F	Item	%	M	SD	Decision	Remark
1	58	42	Willingness to Adopt Deep Learning	82%	3.85	0.78	Accepted	High interest in adoption if institutional support is provided.
2	54	46	AI Training Opportunities	66%	3.45	0.79	Accepted	Training programmes will enhance integration.
3	61	39	Access to AI Infrastructure	55%	3.20	0.72	Accepted	Improvements in computing resources needed.
4	53	47	Policy and Curriculum Integration	63%	3.50	0.75	Accepted	Deep learning should be formally integrated into curricula.
5	59	41	Industry Collaboration	70%	3.60	0.78	Accepted	Partnerships with AI firms will boost adoption.

Despite the barriers, the findings indicate a high willingness to adopt deep learning (82%), with 66% of lecturers supporting AI training programmes. However, only 55% reported having access to AI infrastructure, while 63% emphasized the need for curriculum integration. Additionally, 70% recommended industry collaborations. These findings suggest that with better training, infrastructure, and collaborations, deep learning integration in education can be successfully implemented. This study found 82% of lecturers willing to integrate AI if provided with institutional support, compared to 50% faculty readiness in North America (Baker & Siemens, 2014). This suggests that Nigerian lecturers are enthusiastic about deep learning, but face structural barriers. Financial barriers dominate in Nigeria, while computing power is a greater issue in other regions. Funding constraints ($p = 0.03$) were the biggest concern in this study. Wang & Fong (2020) found that universities in Asia struggled more with access to computing resources than funding. Deep learning adoption is expected to rise significantly in the next 5 years. Liao & Lai (2020) predict that AI will be a fundamental component of education by 2030. This study confirms strong potential for AI adoption at UIIECEST but recommends more investments in AI infrastructure and lecturers` training.

Major Findings from the Results

1. Moderate Awareness, but Limited Expertise – Most lecturers understand deep learning conceptually but lack hands-on experience.
2. Minimal Practical Application – Few lecturers actively use deep learning in teaching or assessment, highlighting a gap between awareness and application.
3. Strong Perception of AI's Importance – Faculty recognize deep learning's value and support curriculum reforms.
4. Significant Barriers Exist – Training gaps, lack of resources, and institutional support hinder deep learning adoption.
5. High Willingness to Adopt AI – If institutions provide necessary support, deep learning adoption in education could significantly increase.

The study highlights that while awareness of deep learning exists, practical implementation remains low due to systemic barriers. However, strong lecturers' interest and perceived

importance indicate a high potential for deep learning integration in education. Addressing training gaps, improving access to AI tools, and fostering collaborations with AI research institutions will be critical in ensuring successful deep learning adoption.

Table 6: Summary of Hypotheses Testing Results

S/N	Hypotheses	Chi-Square Value	p-value	Decision	Remarks
1	Awareness of deep learning influences its integration into teaching.	$\chi^2 = 6.35$	0.08	Rejected	Awareness exists but does not significantly influence adoption.
2	Deep learning is perceived as highly important for modern education.	$\chi^2 = 12.65$	0.01	Accepted	High importance confirmed.
3	Lack of training is a major barrier to deep learning adoption.	$\chi^2 = 10.89$	0.04	Accepted	Training gaps hinder adoption.
4	There is a significant difference in the awareness of deep learning across faculties.	$\chi^2 = 3.85$	0.12	Rejected	Awareness is uniform across faculties.
5	Institutional support significantly influences deep learning adoption.	$\chi^2 = 15.42$	0.001	Accepted	Institutional support is key to adoption.

Interpretation and Discussion of Hypotheses

1. H1 Rejected: The awareness of deep learning among lecturers does not significantly influence its integration into teaching practices ($p = 0.08$). This suggests that despite familiarity, challenges like training and institutional support hinder adoption.
2. H2 Accepted: Deep learning is perceived as essential for modern education ($p = 0.01$), confirming strong lecturer interest in AI-driven teaching methods.
3. H3 Accepted: Lack of training is a significant barrier ($p = 0.04$), highlighting the need for structured faculty development programmes.
4. H4 Rejected: No significant difference in deep learning awareness across faculties ($p = 0.12$), indicating uniform knowledge levels.
5. H5 Accepted: Institutional support significantly influences deep learning adoption ($p = 0.001$), emphasizing the need for AI funding and resources.

Summary

This study examined the awareness, application, and perception of deep learning among lecturers of UIIECEST, Bama. Findings revealed that while awareness of deep learning is moderate (74%), practical application remains low (40%). The key barriers include lack of

training (70%), inadequate institutional support (65%), and limited access to AI resources (58%). Despite these challenges, 82% of lecturers expressed willingness to adopt deep learning if institutional support is provided. These findings highlight the need for structured AI training, curriculum integration, and increased investment in infrastructure.

Conclusion

The study sought to investigate the awareness, application, and perception of deep learning among lecturers of Umar Ibn Ibrahim El-Kanemi College of Education Science and Technology (UIIECEST), Bama. Specifically, the study investigated the level of awareness of deep learning, application of deep learning in teaching and research, lecturers' perceptions regarding the importance of deep learning in education, challenges hindering deep learning adoption and future potential of deep learning integration in higher education. The study concludes that although lecturers at UIIECEST are aware of deep learning, its practical implementation remains minimal due to systemic challenges. The major barriers identified include insufficient training, inadequate institutional support, and limited AI resources. However, the strong willingness to adopt deep learning suggests that with proper support, lecturers can integrate AI-driven approaches into their teaching and research.

Recommendations

To enhance deep learning adoption in higher education, it is recommended that:

1. Structured AI Training Programmes – The institution should organize regular workshops, seminars, and AI training sessions to improve lecturers' competencies.
2. Infrastructural Development – Investment in high-performance computing resources and AI labs is necessary for deep learning applications.
3. Policy and Curriculum Integration – Deep learning should be formally incorporated into teaching curricula to ensure sustainability.
4. Institutional Support – AI adoption requires policy adjustments, funding, and administrative backing to encourage faculty participation.
5. Industry Collaboration – The institution should establish partnerships with AI-focused industries and research centers for knowledge exchange and resource access.

Implications of the Study

For higher education institutions, the findings of this study emphasize the urgent need for AI-focused policies, training programmes, and infrastructural investments to equip lecturers with AI competencies. Without such interventions, institutions risk falling behind in the global shift toward AI-driven education. For lecturers, the study highlights the importance of continuous professional development in AI and deep learning to remain relevant in a rapidly evolving digital landscape.

From a policymaking perspective, governments and educational authorities must prioritize AI education through funding allocations, curriculum reforms, and capacity-building initiatives. This study also provides a foundation for further research on AI adoption strategies, training effectiveness, and the long-term impact of deep learning on education. Ultimately, addressing these challenges will ensure that tertiary institutions remain competitive and future-ready in an AI-dominated academic and professional environment.

Suggestions for Further Studies

1. Investigate the impact of AI-focused training programmes on deep learning adoption among lecturers.
2. Explore the effectiveness of deep learning-based teaching methods in improving student learning outcomes.
3. Conduct a cross-institutional comparison of AI adoption levels in developing countries.
4. Assess the role of industry-academic collaborations in promoting AI education.
5. Examine the long-term sustainability of deep learning integration in tertiary institutions.

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