ARTIFICIAL INTELLIGENCE APPLICATIONS (AIAs) FOR EFFECTIVE EDUCATIONAL MANAGEMENT AND ADMINISTRATION: AN EVALUATION OF AWARENESS AND UTILIZATION IN FEDERAL COLLEGE OF EDUCATION OBUDU, CROSS RIVER STATE, NIGERIA.

Dr. Ateb, Gertrude Alorye
Educational Foundations Department
Federal College of Education, Obudu.
Aloryejesus33@gmail.com

Abstract

The study adopted the survey design to examine Artificial Intelligence Applications (AIAs) for efficient educational management and administration: an evaluation of awareness and utilization. Consequently, three research questions and three hypotheses guided the study. The population consisted of 132 administrators from Federal College of Education Obudu in Cross River State. The whole population was used as the sample. The instrument for the study was entitled, "Awareness and Utilization of Artificial Intelligence Application for Educational Management and Administration Questionnaire" (AUAIAEMAQ). The instrument was validated by experts and its overall reliability index was established at .85 using Cronbach alpha statistics. Means and standard deviation was used to answer research questions. The criterion (estimated) mean for accepting the item opinions of the respondents as positive was 2.50 and above while any mean below 2.50 was regarded as negative for the research questions. The instruments adopted the modified four point type Likert scale of Very Aware (VA), Aware (A), Unaware (UA), Very Unaware (VUA); Very High Extent (VHE), High Extent (HE), Low Extent (LE), Very Low Extent (VLE) and Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) with a weighting of 4, 3, 2 and 1 for research question 1, 2 and 3. The AIAS awareness, utilization level and challenges were determined using the following criteria; Grand means ≤ 2= Low, >2 ≤ 3= average and >3= high. Means 0-2=low awareness/utilization, 2.1-2.9= average awareness/utilization, and 3.0-above= high awareness/utilization level while the Nonparametric Independent Sample Mann-Whitney U Test was used to test the hypotheses at .05 level of significance because the data obtain did not meet certain statistics assumptions (Kolmogorov-Smirnov test for normality) for the use of a parametric statistic. The researcher, therefore, administered 132 copies of the questionnaires to the respondents and retrieved them for the analysis of the research questions and hypotheses. Data collected were analysed using IBM SPSS statistics 23. Based on the findings, it was concluded that the adoption of AI has thus been steadily acknowledged in educational management and administration as the most significant method by which administrators connect organizational activities. It was, therefore, recommended that there should be conscious efforts by educational institutions to intermittently trained administrators to be acquainted with the current trend of artificial intelligence tools used to ameliorate distance in job responsibilities.

Keywords: *Artificial Intelligence Application, Educational Management, Administration, Awareness, Utilization.*

Introduction

The use of information and communication technology (ICT) has revolutionised every aspect of human growth, and this has resulted in constant, dynamic changes to the educational system. Currently, managers and administrators in the educational sector are under pressure to stay up to date with technical advancements due to computer applications powered by Artificial Intelligence Applications (AIAs). John McCarthy, a retired Stanford professor of computer science, invented artificial intelligence in 1956, and it has shown to be the most effective way to overcome the difficulties of 21st-century management and administrative tasks. Although the application of AIAs in educational management and administration is still in its early phases, it has already demonstrated encouraging outcomes. Artificial intelligence is believed to have increased the effectiveness of administration and management (Chen et al., 2020). This is because it provides reassuringly competitive benefits in task responsibility.

By extension, artificial intelligence technologies helps in administration, management and instruction by effectively automating repetitive administrative tasks, personalising and stimulating instruction, and conducting adaptive assessments. These are in line with the views of Owoc et al. (2013), who maintained that artificial intelligence technology is altering the management of the educational system by eliminating monotonous and ineffectual work and supplying knowledge continuously from a variety of sources while Al facilitates the development of astonishing skills. As a result, anyone who is an administrator, lecturer, or student who does not understand how artificial intelligence is applied will not be able to stay up effectively with the times in their respective offices with respect to their jobs obligation.

The term artificial intelligence (Al) describes a machine or computer programme that uses aspects of human-like reasoning to accomplish a task. On the other hand, McCarthy (2004) described artificial intelligence (AI) as the science and engineering of building intelligent machines. Global competitiveness, future workforce development, and economic progress are all attributed to artificial intelligence (AI) (Cetindamar et al., 2022; Sestino & De Mauro, 2022). The term "AI literacy" refers to the creation and application of AI learning activities, learning tools and applications, and pedagogical models. It was inspired by researchers' desire to provide educators and students with the knowledge, abilities, and attitudes necessary to succeed in an AI-rich future (Miao et al., 2021; Rina et al., 2022; Wang & Cheng, 2021).

Though, many people thinks that AI is ruining education. Using AI in education can have a dramatic impact on the way administrative and management staff use their time and the manner in which students are served individually (Li et al., 2019). Currently, the introduction of AI has gradually been recognized in educational management and administration as the most important means by which administrators connect both management and administrative tasks. In other words, AI is gradually being introduced into institutions to reduce the amount of time required to complete these tasks (Johnson, 2019). It should be noted that AIAs are not replacing the existing staff of any educational institution nor ruining education rather they assist them (assistive technologies).

Numerous managerial and administrative responsibilities are also a part of learning and education. Planning and budgeting, scheduling classes or sessions for students, managing the admissions process, selecting qualified applicants, offering counselling, library services, evaluation, feedback, tutoring, and so on are a few of these responsibilities. AI has become a popular research issue in general and an expanding field in education because of its significance (Reid, 1995). As it has a strong association with both management and administrative tasks. Different types of assessments, behaviour patterns, tasks like the development of curriculum, course planning, and evaluation and many other elements can be obtained and assisted through it (Chen et al., 2020).

To further strengthen the above statement Lynch (2018) posits that the application of AIAS in education (administration and management) includes but not limited to the following;

- Data and Learning Analytics: AI is currently being used by teachers and education administrators to analyze and interpret data, enabling them to make better-informed decisions.
- Scheduling: Helping administrators to schedule courses and individuals to manage their daily, weekly, monthly or yearly schedules.
- Facilities Management: AI is effective at monitoring the status of power, Wi-Fi and water services; alerting the facilities management workers when problems arise.
- Overall School Management: AI is currently being used to manage entire schools, powering student records systems, transportation, IT, maintenance, scheduling, budgeting, etc.

To support the argument, a lot of educational institutions use AIAs in the admissions process. As a result, submitting an online application to the admission department starts the admissions process. The admission form also includes a series of repeated questions from applicants and their parents, which are challenging to answer in a short amount of time (Goksel, 2019). In order to tackle the problem, many educational establishments employ artificial intelligence (AI) solutions, such as chatbots, to manage the high volume of requests that arise throughout the admissions process (Bird, 2019).

A chatbot is a piece of software that mimics a human user's communication through the use of text, voice, graphics, or a combination of verbal and visual cues (Argal, 2018). It responds to visitors on websites like a human might in a lot of commercial and educational institutions (Kjersti, 1999). Virtual assistants powered by technology, or chatbots, are created using AI or pre-written scripts. It functions around-the-clock by offering the information and responses pertaining to admittance. It lessens the workload for the admissions staff, etc., in addition to assisting visitors or information seekers in getting what they need around-the-clock.

(Cui, 2017). Moreover, educational establishments also handle hiring personnel and reviewing employment applications (Karam, 2017). These days, AIAs assist institutions in effortlessly managing the aforementioned activities. In addition to being used to analyse job applications, the AI-based technology assists the human resources department in effectively handling the applications. According to Gobert (2012), these technologies automatically establish criteria for the ideal applicants and gather information that serves as a guide for interviews and other processes.

Also, AIAs has the potential to automate administrative tasks for lecturers and academic institutions. There appears to be a proclivity for managing a variety of non-teaching responsibilities, such as grading exams, creating assignments, assessing homework, as well as coordinating attendance, parents' meetings, and other duties thereby simplifying both academic and administrative responsibilities. It includes dynamic scheduling and predictive analysis of educational tasks. This is due to technology's ability to integrate with modern education, resulting in dynamic scheduling and predictive analysis for tracking progress (Ku Chhaya et al., 2020). It has the potential to revolutionize a wide range of projects and programs in the process of educational management and school administration. According to a study conducted at Carnegie Mellon University (CMU), artificial intelligence can provide more efficient ways of providing powerful administrative tools for dynamic work schedules. Thus, the evolution of artificial intelligence has been unavoidable in recent years. Although educational administrators may be slower to adopt artificial intelligence and machine learning, the changes are beginning to spread throughout the educational system.

Again, it leads to the formation of adaptive tasks in educational management and administration. In this case, it assigns tasks such as planning, coordinating, organizing, budgeting, and so on based on the designed objectives and goals. In other words, projects and programs can be easily integrated to increase accessibility and relevance. AIAs generate adaptive data group formation. Artificial intelligence offers a novel approach to making educational management and administrative activities more engaging at all levels. This is because interactive learning techniques that are not currently available in educational institutions can provide instant feedback and gauge interest. This implies that artificial intelligence can improve current administrative methods.

Below are few examples of AIAs for management and administrative efficiency;

AIAS FOR ADMINISTRATIVE AND MANAGEMENT EFFICIENCY	
NAME	**FUNCTION**
1. Powerschool.ai	Managing information about students in a school
2. Ivy chatbot.ai and virtual assistant	Providing necessary knowledge and answers to questions
3. chatGPT.ai	Lesson planning/curriculum
4. DocuExprt.ai	Documents verification
5. AI admission interview.ai	Interviews (admission and employment)
6. AI question paper generator.ai	Examination questions generator
7. Generative AI assessment.ai	Assessments
8. Smart sparrow.ai	Adaptive and personalised learning technology
9. Eklavvya.ai	Auto descriptive answers evaluator
10. Kaltura.ai	Training, LMS, virtual classrooms etc
11. Gradecalculator.ai	Grade calculator
12. Netex learning.ai	Learning cloud LMS, e-learning
13. Cram101.ai	Transform textbook to smart study guide
14. Gradescope.ai	Grading
15. Co-pilot education.ai	Lesson plans
16. Yippity.ai	Quiz
17. Sendsteps.ai	Presentations
18. Turnitin.ai	Plagiarism test
19. Quillbot.ai	AI text summarizer, plagiarism, paraphrasing etc.

Table 1. AIAs for administrative and management efficiency

However, educational administration and management are separate specialisations that require the use of AIAs throughout task performance. However, there are a number of serious ethical questions and concerns associated with the use of AI in school management in the future, including the possibility of bias, privacy violations, and a loss of human touch. According to Baroody et al. (2021), educators and legislators must provide a thorough framework for the moral and responsible application of AI in educational administration, taking into account both the advantages and disadvantages of AI-based technologies.

It is difficult to maintain moral and ethical policies, which are aspects of human characteristics that cannot be incorporated into artificial intelligence. It is widely acknowledged that modem artificial intelligence applications lack morality, AI is more likely to result in job losses and increased income inequality because activities such as trucking, food service, and distribution can be automated (Sahar, 2021). Again it is thought that the AIAs reduces the thinking power of administrators and educational planners. In this case, it will lower the administrators' creative capacity, leading to doldrums or unproductiveness in the workplace.

In summary, AIAs can help parents and students with the admissions process and offer feedback. They can also support administrators and teachers with a variety of challenging tasks, such as budgeting, student enrolment, course management, application or data management, etc., which not only increases the effectiveness and efficiency of the educational system but also frees up more time for teachers to teach. AI technologies also help with facilities management, lower operating expenses for institutions, and increase responsiveness. Furthermore, these technologies also lessen prejudices in a variety of situations where trustworthiness is important and human impact is strong. The areas that are susceptible to influence include hiring, firing, grading, admissions, and evaluation; however, if the system is based on impartial algorithms, the likelihood of this happening is reduced and the system's reputation is enhanced.

This study therefore, aimed to explore AIAs awareness and how they transform and assist in various managerial and administrative activities through their use. The study is beneficial to educational institutions, policy-makers, teachers, and other support staff in the context of AIAs usage and implementation. AIAs should not be confused with Information Technology Applications. The scope and focus of the study are purely managerial, not technical, and are limited to AIAs only.

Theoretical Framework

Technology Acceptance Model (TAM) by Davis (1989)

Davis (1989) developed TAM, which is a theory of information system that provides and models an explanation of how an individual accepts and uses technology. TAM elucidates the technology determinant acceptance, which can explain the behaviour of a user from a broad array of emerging end-user technologies of computing together with the user populace while simultaneously justifying the theoretical and economic viewpoints (Davis, 1989).Five constructs establish an aspect of TAM: perceived ease of use (PEU), perceived usefulness (PU), attitude towards use (ATT), behavioural intention (BI) and actual use (AU). These constructs are considered the primary determinants for users with regard to application and technology acceptance. TAM states that both PEU and PU affect the attitudes of individuals towards the use of technology. When users perceive a specific technology as easy to use and useful, they can formulate a positive attitude towards the use of this specific technology. Therefore, if users have a positive intention towards a given technology, they are likely to use it in their daily lives.

The theory is related to this study because it provides a model and gives an explanation of how an individual (educational administrators and managers) accepts and uses technology in the educational institution, hence AIAs encompasses the use of technologies.

Statement of the Problem

Researchers have contended that advances in science, technology, and inventions will come from artificial intelligence. This is corroborated by the fact that computers can do tasks that are too complicated for human brains, operate faster than humans, detect and eradicate mistakes and flaws, and extract deeper meanings and patterns from data. Thus, productivity could be greatly increased with AIAs. At the moment, artificial intelligence is mostly being focused on automation. Instead of representing a self-aware, self-evolving artificial being, the tool currently in use represents groups of programmed processes that are scheduled to be executed at a specific trigger, condition, or order. However, despite the fundamental benefits of artificial intelligence, educational institutions appear uninterested in the efficacy and efficiency of AIAs when applied to management and administration of their institutions. This could be because of a lack of

knowledge or other obstacles that have prevented them from embracing this development. In light of this, the researcher plan to investigate the Federal College of Education in Obudu, Cross Rivers State, Nigeria, regarding its awareness and use of AIAs as a tool for efficient educational management and administration.

Purpose of the Study

The purpose of the study was to examine Artificial Intelligence Applications (AIAs) for efficient educational management and administration: an evaluation of awareness and utilization in Federal College of Education Obudu in Cross River State. The specific objectives are:

- To determine the level of awareness of AIAs for educational management and administration.
- To investigate the extent of utilization of AIAs for educational management and administration.
- To find out the challenges to the effective utilization of AIAs for educational management and administration.

Research Questions

The following questions guided the study:

- What is the level of awareness of AIAs for educational management and administration?
- What is the extent of utilization of AIAs for educational management and administration?
- What are the challenges to the effective utilization of AIAs for educational management and administration?

Hypotheses

1. There is no significant difference in the mean responses of administrators on the level of awareness of AIAs for educational management and administration.
2. There is no significant difference in the mean responses of administrators on the extent of utilization of AIAs for educational management and administration.
3. There is no significant difference in the mean responses of administrators on the challenges of effective utilization of AIAs on educational management and administration.

Methodology

The study is a survey design intended to examine Artificial Intelligence Applications (AIAs) for efficient educational management and administration: an evaluation of awareness and utilization. Consequently, three research questions and three hypotheses guided the study. The population consisted of 132 administrators from Federal College of Education Obudu in Cross River State. The whole population was used as the sample. The instrument for the study was entitled, "Awareness and Utilization of Artificial Intelligence Application for Educational Management and Administration Questionnaire" (AUAIAEMAQ). The instrument was validated by experts and its overall reliability index was established at .85 using Cronbach alpha statistics. Means and standard deviation was used to answer research questions. The criterion (estimated) mean for accepting the item opinions of the respondents as positive was 2.50 and above while any mean below 2.50 was regarded as negative for the research questions. The instruments adopted the modified four point type Likert scale of Very Aware (VA), Aware (A), Unaware (UA), Very Unaware (VUA); Very High Extent (VHE), High Extent (HE), Low Extent (LE), Very Low Extent (VLE) and Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) with a weighting of 4, 3, 2 and 1 for research question 1, 2 and 3. The AIAs awareness, utilization level and challenges were determined using the following criteria; Grand means ≤ 2= Low, >2 ≤ 3= average and >3= high. Means 0-2=low awareness/utilization, 2.1-2.9= average awareness/utilization, and 3.0-above= high awareness/utilization level while the Nonparametric Independent Sample Mann-Whitney U Test was used to test the hypotheses at .05 level of significance because the data obtain did not meet certain assumptions (Kolmogorov-Smirnov test for normality) for the use of a parametric statistic. The researcher, therefore, administered 132 copies of the questionnaires to the respondents and retrieved them for the analysis of the research questions and hypotheses.

Results

Research Question 1: What is your level of awareness of AIA for educational management and administration?

Table 2: What is your level of awareness of AIA for educational management and administration?

Items	N	Mean	Std. Deviation	Decision
AI admission interview	132	1.47	.516	Low
AI question paper generator	132	1.48	.501	Low
Powerschool	132	1.52	.517	Low
DocuExprt	132	1.91	1.044	Low
Generative AI assessment	132	1.63	.623	Low
Valid N (listwise)	**132**			

Grand Means = 1.60

Table 2 shows the level of awareness of AIA for educational management and administration. All the items listed in table 2 are shown to have a mean values below the criterion mean of 2.5, more so, the grand mean of 1.60 ≤ 2, and this shows that the respondents have low level awareness of AIA for educational management and administration.

Research Question 2: What is the extent of utilization of AIA for educational management and administration?

Table 3: What is the extent of utilization of AIA for educational management and administration?

	N	Mean	Std. Deviation	Decision
AI admission interview	132	1.40	.507	Low
AI question paper generator	132	1.47	.516	Low
Powerschool	132	2.27	1.145	Low
DocuExprt	132	1.37	.500	Low
Generative AI assessment	132	1.97	1.112	Low
Valid N (listwise)	**132**			

Grand Means = 1.69

Table 3 shows the extent of utilization of AIA for educational management and administration. All the items listed in table 3 are shown to have a mean values below the criterion mean of 2.5, more so, the grand mean of 1.69 ≤ 2, and this shows that the respondents have low extent of utilization of AIA for educational management and administration.

Research Question 3: What are the challenges to the effective utilization of AIA for educational management and administration?

Table 4: What are the challenges to the effective utilization of AIA for educational management and administration?

	N	Mean	Std. Deviation	Decision
Lack of orientation on the availability and use of AIA for educational management and administration	132	3.31	1.049	High
Erratic Power supply	132	3.10	3.188	High
Poor internet access	132	3.31	1.049	High
Inadequate/Lack of ICT skills to manipulate AIA	132	3.05	1.158	High
lack of ICT facilities in the school to support AIA usage	132	2.39	1.277	Average
Valid N (listwise)	**132**			

Grand Means = 3.03

Table 4 shows the challenges to the effective utilization of AIA for educational management and administration. All the items listed in table 4 are shown to have mean values above the criterion mean of 2.5 except item 5 (lack of ICT facilities in the school to support AIA usage) which has a mean value of 2.39 below

the criterion mean of 2.5. More so, this shows that the respondents have challenges to the utilization of AIA for educational management and administration. Most notable among the challenges are Poor internet access, Inadequate/Lack of ICT skills to manipulate AIA, Erratic Power supply and Lack of orientation on the availability and use of AIA for educational management and administration with mean values above 3.0 each. More so, the grand mean of 3.03 ≥ 2, and this shows that the respondents have great challenges with respect to the effective utilization of AIA for educational management and administration.

Hypotheses

Ho_1: There is no significant difference in the mean responses of administrators on the level of awareness of AIA for educational management and administration.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Hypotheses1onAwarenessofAIA is the same across categories of gender.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
2	The distribution of Hypotheses2onUtilizationofAIA is the same across categories of gender.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
3	The distribution of Hypotheses3onChallengesofAIA is the same across categories of gender.	Independent-Samples Mann-Whitney U Test	.578	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table 5: Independent Sample Mann-Whitney U Test Hypotheses Test Summary.

The result of Table 5 shows that the Independent Sample Mann-Whitney U Test Hypotheses Test Summary shows that sig. (.000) is less than 0.05 level of significance. Hence, the null hypothesis of no significant difference in the mean responses of administrators on the level of awareness of AIA for educational management and administration was therefore rejected based on the decision of the test.

Ho_2: There is no significant difference in the mean responses of administrators on the extent of utilization of AIA for educational management and administration.

The result of Table 5 shows that the Independent Sample Mann-Whitney U Test Hypotheses Test Summary shows that sig. (.000) is less than 0.05 level of significance. Hence, the null hypothesis of no significant difference in the mean responses of administrators on the extent of utilization of AIA for educational management and administration was therefore rejected based on the decision of the test.

Ho_3: There is no significant difference in the mean responses of administrators on the challenges of effective utilization of AIA on educational management and administration.

The result of Table 5 shows that the Independent Sample Mann-Whitney U Test Hypotheses Test Summary shows that sig. (.578) is greater than 0.05 level of significance. Hence, the null hypothesis of no significant difference in the mean responses of administrators on the challenges of effective utilization of AIA on educational management and administration was therefore not rejected based on the decision of the test.

Discussion of Findings

The result of findings on research question one indicated that administrators of Federal College of Education Obudu, Cross River State Nigeria have low level of awareness of AIAs for educational management and administration. This could be attributed to the fact that educational institutions in Nigeria particularly the school in focus do not sufficiently give it staff proper orientation/awareness and in-service trainings on such important technologies such as AIAs. While most administrators interact with different applications online to support their management and administrative duties, their level of awareness of the material within the AIAs

framework is low. This findings lends credence to the submission made by Johnsonts' (2019) that the introduction of AI is gradually gaining acceptance in educational management and administration. In other words, AI is gradually being introduced into institutions to reduce the amount of time required to complete administrative tasks.

The result of findings on research question two on the extent of utilization of AIAs for educational management and administration at the Federal College of Education Obudu, Cross River State Nigeria is significantly low. This is in line with findings from (Koko, 2014), revealed that AIAS have not really been utilized by Nigerian universities.

The answer to research question three showed that administrators of the Federal College of Education Obudu, Cross River State Nigeria are faced with challenges with respect to the use of AIAs, the result of the study showed that Poor internet access, Inadequate/Lack of ICT skills to manipulate AIAs, Erratic Power supply and Lack of orientation on the availability and use of AIAs for educational management and administration were the significant challenges administrators faced. This result corroborates the findings of Shams et al., (2020) and Mwinyimbegu (2018) who also found that poor electricity supply, low internet bandwidth, listed lack of access to computers, lack of internet search skills, lack of time to look for suitable resources etc. were some of the major barriers to the use of technologies and open educational resources in higher education.

Conclusion

Thus, the most important way for administrators to link organisational activities in education is through the increasing deployment of AI in management and administration. Stated differently, institutions are progressively integrating AI to reduce the time required to complete administrative tasks. This tool has the benefit of requiring a greater variety of skills and knowledge to be accessible for improving job productivity.

Recommendations

- The administrators should be intermittently trained to be acquainted with the current trend of artificial intelligence tools used to ameliorate distance in job responsibilities.
- Tertiary institutions should collaborate on the use of artificial intelligence for effective and efficient utilization
- The government should make provisions for facilities to be available in every higher institution.

References

Argal, A., Gupta, S., Modi, A., Pandey, P., Shim, S., Choo, C. (2018). *Intelligent travel chatbot for predictive recommendation in echo platform*. In Proceedings of the 2018 IEEE 8th Annual Computing and Communication Workshop and Conference, Las Vegas, NV, USA.

Baroody, A., & Wilkins-Yel, K. G. (2021). Ethical considerations for the use of artificial intelligence in education. *Journal of Educational Technology & Society, 24*(2), 61-72.

Bird, J.J., Ekart, A., Faria, D.R. (2018). *Learning from interaction: An intelligent networked-based human-bot and bot-bot chatbot system. In Advances in Computational Intelligence Systems*, 1st ed.; Springer: Nottingham, UK.

Cetindamar, D., Kitto, K., Wu, M., Zhang, Y., Abedin, B., & Knight, S. (2022). Explicating AI literacy of employees at digital workplaces. *IEEE Transactions on Engineering Management, 71*, 810–823.

Chen, L., Chen, P. & Em, Z. (2020). Artificial Intelligence in Education: A Review. *IEEE Access, 8*, 75264-75278.

Chen, N. S., Yin, C., Isaias, P., Psotka, J. (2020). Educational big data: Extracting meaning from data for smart education. *Interact. Learn. Environ. 28*, 142–147.

Cui, L., Huang, S., Wei, F., Tan, C., Duan, C., Zhou, M. (2017). *Superagent: A customer service chatbot for e-commerce websites*. In Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics, ACL 2017, Vancouver, BC, Canada.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly,* 319-340.

Gobert, J.D., Sao Pedro, M.A., Baker, R.S., Toto, E., Montalvo, O. (2012). Leveraging educational data mining for real-time performance assessment of scientific inquiry skills within microworlds. *J. Educ. Data Min. 4*, 104–143.

Goksel, N., Bozkurt, A. (2019). *Artificial intelligence in education: Current insights and future perspectives. In Handbook of Research on Learning in the Age of Transhumanism*; Sisman-Ugur, S., Kurubacak, G., Eds.; IGI Global: Hershey, PA, USA.

Johnson, A. (2019). *Ways Al is changing the education industry*. Retrieved from https://eleamingindustry.com/ai-is-changing-the-education-industry-5 -ways on 23/5/2024

Karam, R., Pane, J.F., Griffin, B.A., Robyn, A., Phillips, A., Daugherty, L. (2017). Examining the implementation of technology-based blended algebra I curriculum at scale. *Educ. Technol. Res. Dev. 65*, 399–425.

Kjersti, B. (1999). *The chatbot will see you now. Can chatbots be a supplementary element in doctor-patient communication?* Norwegian University of Science and Technology: Trondheim, Norway.

Koko, M.N. & Edo, B.L. (2014). *Knowledge production policies in Nigeria universities*. Workshop/Conference on Improving Higher Education through Stakeholders Collaboration, 28th 29th August CHES Uniport.

Ku. Chhaya, A. K. & Ravindra, D. S. (2020). Advantages and disadvantages of artificial intelligence and machine learning: A literature review. *Interactional Journal of Library & Information Science (IJLIS), 9*(1), 30-36

Li, H.; Gobert, J.; Dickler, R. (2019). *Evaluating the transfer of scaffolded inquiry: What sticks and does it last. In Artificial Intelligence in Education*; Isotani, S., Millán, E., Ogan, A., Hastings, P., McLaren, B., Luckin, R., Eds.; Springer: Cham, Switzerland, 163–168.

Lynch, M. (2018). *How artificial intelligence is already transforming education*. Educationweek. Retrieved from www.edweek.org/ on 24/05/2024

McCarthy, J. (2004). What is artificial intelligence? *Engineering Materials and Design, 32*(3), 1–14.

Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). *AI and education: A guidance for policymakers*. UNESCO Publishing.

Mwinyimbegu, C. M. (2018). The Role of Libraries and Librarians in Open Educational Resources in Tanzania: the Case of Selected Public University Libraries. *Library Philosophy and Practice (e-journal).* http://digitalcommons.unl.edu/libphilprac/2097

Owoc, M. & Marciniak, K. (2013). Knowledge management as foundation of smart university. In 2013 Federated Conference on Computer Science and Information Systems, 1267-1272. IEEE.

Reid, J.M. (1995). *Learning Styles in the ESL/EFL Classroom*; Heinle & Heinle Publishers: Florence, KY, USA.

Rina, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The Digital competence framework for citizens-with new examples of knowledge, skills and attitudes* (No. JRC128415). Joint Research Centre (Seville site).

Sahar, S. (2021). *Limitations of artificial intelligence.* Retrieved from: https: //scholarworks.rit.edu/cgi/ viewcontent.cgi?article= 12113 & contexttheses on 11/05/24

Sestino, A., & De Mauro, A. (2022). Leveraging artificial intelligence in business: Implications, applications and methods. *Technology Analysis & Strategic Management, 34*(1), 16–29.

Shams, S., Haq, M., Waqar, Y. (2020). *Open Educational Resources (OER) Usage Trends Among University Students Of Pakistan*. Education and Information Technologies. Retrieved from https://doi.org/10.1007/s10639-020-10195-3 on 20/05/2023

Wang, T., & Cheng, E. C. K. (2021). An investigation of barriers to Hong Kong K-12 schools incorporating Artificial Intelligence in education. *Computers and Education: Artificial Intelligence, 2*, 100031.