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Examining the Credibility of Artificial Intelligence (AI) in Educational Management: Implications for Administration and Planning

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Abstract **Original Research Article**

The significant advancement of AI has permeated various aspects of human life, including the field of education. The rapid integration of AI-powered tools in school management has enhanced effectiveness and efficiency in achieving educational goals, such as improved accuracy in enrollment forecasting, optimized resource allocation, streamlined teacher recruitment, efficient scheduling, data visualization for equity and inclusion, and customized curriculum development. AI has the potential to transform educational management dimensions without replacing human efforts. This paper examines the diverse applications of AI-powered tools in educational planning, administration, and supervision, including the use of large-scale algorithms to develop AI models for these purposes. It also explores the application of AI in organizing, directing, coordinating, staffing, and budgeting within the educational context. Furthermore, the paper evaluates the roles of administrators in AI-based school management and addresses the challenges associated with implementing AI-powered tools in educational planning, administration, and supervision. Strategies for overcoming these challenges are presented. In conclusion, the deployment of AI-powered tools in educational planning, administration, and supervision has its strengths and weaknesses. Therefore, policymakers, school administrators, teachers, and other stakeholders must collaborate to develop robust strategies for maximizing the benefits of AI while mitigating associated risks. The integration of AI in educational planning, administration, and supervision has the potential to revolutionize educational management, improve curriculum planning, enhance resource administration, support program supervision, and equip school managers with the necessary competencies in the AI era.

Keywords: Chatbots, Educational Administration, Enhanced Accountability, Equity, Inclusion

1. INTRODUCTION

Artificial Intelligence (AI) is the fastest developing computer industry which can perform tasks that typically require human intelligence, such as learning, perception, reasoning, problem-solving, and decision-making. AI systems use algorithms and statistical models to analyze vast amounts of data, recognize patterns, and make predictions or decisions based on that analysis. There are several subfields of AI, including machine learning, natural language processing, computer vision, robotics, and expert systems. AI has many applications in various industries, such as healthcare, finance, transportation, and manufacturing, and is rapidly transforming the way humans live and work (Abu-Qarn & Abu- Bader, 2018). The scope of AI is vast and constantly expanding, as researchers and developers continue to explore new ways to apply AI techniques and technologies to various fields and industries. Ackerson and Subramanian (2016) opined that some of the areas where AI has already had a significant impact include but not limited to improving diagnostics, developing personalized treatments and accelerating drug discovery.

Also, AI is being used to detect fraud, make investment decisions, and improve customer service. It is equally applicable in

optimizing traffic flow, improving safety, and developing autonomous vehicles, enhancing production processes, improving quality control, and reducing waste in various manufacturing industries. It is quite interesting to note that AI is being used to optimize crop yields, monitor soil conditions, and improve pest management in the Agricultural sector (Ahmad, et al., 2021). AI is also being used to develop personalized content recommendations, create realistic virtual worlds, and improve video game AI. Thus, with all these relevance and more, AI is being applied to personalize learning, develop intelligent tutoring systems, and automate administrative tasks in the school system. By logical extension, this implies that AI could be used in educational planning, administration and supervision of the available humans, material and financial resources in the school system in order to enhance the quality of services provided to students, teachers and the general public (Uzoigwe, Ibas & Chuktu, 2021). Therefore, as AI technology continues to evolve and improve, its scope is likely to expand even further, creating new opportunities for innovation and sustainable growth in the educational industry.

According to Al-Hmoud and Al-Samarraie (2019), several AI tools such as Learning Management Systems (LMS), Adaptive Learning Platforms, Intelligent Tutoring Systems (ITS), Educational Data Mining (EDM), Chatbots, Predictive Analytics, Virtual Learning Assistants and ChatGPT and Speech Recognition Technology among others have been recognized as just a few examples of the many AI-powered tools that can be used in educational planning, administration and supervision. Ali and Oscar (2017) stressed that they are examples of AI tools that have been described as technologies administrators can think with, particularly in the aspect of planning, administering and supervising educational activities in the school system to improve their capacity for critical and reflective thought, foster creativity, acquire problem-solving skills, and effectively grasp concepts for goals attainment (Almaiah, et al., 2022).

The incorporation of AI tools in school management can bring significant benefits to educational planning, administration, and supervision by improving efficiency, enabling data-driven decision-making, and providing personalized support to administrators, teachers and students alike. These tools can analyze data on educational resource utilization and identify areas where resources may be underutilized or overutilized (Atarah, Nsoh & Selorm, 2023). This can help educational planners, administrators and supervisors to allocate resources more efficiently and effectively for school activities such as events, field trips, and extracurricular activities. For instance, AI-powered planning tools can analyze large amounts of data and provide insights which can inform decision-making (AlZoubi & Al-Tarawneh, 2019). AI-powered tools can help educational planners to make data-driven decisions about curriculum planning, resource allocation, and student support (Ayat Jarat & Hammed, 2018). In the same vein, AI-powered administrative tools can analyze student data to identify students who may be at risk of falling behind or dropping out. This can allow educational administrators to intervene early and provide targeted support to help these students to succeed. More so, AI-powered supervisory tools can automate repetitive and time-consuming tasks, such as students' grading, data entry, and scheduling. This can free up valuable time for supervisors and administrators by allowing them to focus on more important tasks (Gao, Wu, & Zhang, 2019).

AI-powered scheduling tools can help administrators to schedule school activities and events more efficiently, taking into account factors such as availability of resources, teachers, and students (Gašević, et al.,2019). This can help to reduce conflicts and ensure that everyone is able to participate despite one's political affiliation, gender, creed, religion and other factors. For instance, AI-powered tools can help administrators to track attendance for school activities, such as field trips and co-curricular activities. This can help to ensure that students are safe and accounted for during these activities. Han (2018) found that AI-powered Chatbots and virtual assistants can provide instant communication and support to students, parents, and teachers regarding school activities. This can help school administrators to ensure that everyone is informed and up-to-date on the latest information regarding school activities.

Hwang and Chen (2018) found that AI-powered tools can analyze data on student interests and preferences and provide personalized recommendations for school activities that may be of interest to them. This can help school managers to increase participation and engagement in educational activities by ensuring that students, teachers, and resources are utilized in the most optimal way possible. In fact, AI-powered tools can help administrators to supervise school activities in several ways. Also, AI-powered tools can track attendance for school activities, such as field trips and extracurricular activities. This can help administrators to ensure that all students are accounted for and safe during these activities (Huang, Yang, Liang & Chiu, 2019).

AI-powered tools can provide real-time monitoring of school activities, allowing administrators to keep track of what is happening and intervene if necessary. AI-powered tools can help administrators to ensure the safety and security of students during school activities. For example, facial recognition technology can be used to identify individuals who may pose a threat to the safety of students. AI-powered Chatbots and virtual assistants can provide instant communication and support to students, parents, and teachers during school activities. This can help to ensure that everyone is informed and up-to-date on the latest information regarding the activity. Huang & Li (2019) found that AI-powered tools can analyze data on school activities, such as attendance, participation, and feedback, providing insights that can inform decision-making and improve future activities. Therefore, the evolution of AI-powered tools have revolutionized the educational sector by providing school administrators with significant discernments into the planning, administrative

and supervisory processes of the school system. Hence, with the evolutionary trends of AI-powered tools in education, it has the credibility to assist administrators in assessing and managing risks related to school activities, ensuring the safety and well-being of students and providing valuable insights that can inform decision-making and improve future safety planning.

On the other hand, the integration of AI in educational planning, administration and supervision is not without potential dangers (Hershkovitz & Nachmias, 2018). For instance, there are critical concerns that AI algorithms may reflect the biases of their creators or the data they were trained on, which can lead to discriminatory outcomes. Illustratively, an AI-powered tool may inadvertently discriminate against certain students or groups based on their race, gender, or other characteristics. Also, it has been observed that AI-powered tools may collect and store personal information about students, parents, and teachers, which can raise privacy concerns. There is a risk that this data may be misused or hacked, potentially leading to identity theft or other negative consequences. It has equally been established that some AI-powered tools can be complex and difficult to understand, making it challenging for school administrators to fully comprehend how they work and the potential risks and limitations associated with using AI-powered tools.

Additionally, overreliance on AI-powered tools by school planners, administrators and supervisors for decision-making can lead to complacency and a lack of critical thinking. In other words, it is conversely important to remember that AI is a tool and should be used in conjunction with human judgment and expertise (Fayaz, et al., 2022). Furthermore, AI-powered tools may experience technical failures, which can result in unexpected outcomes or unintended consequences. For example, an AI-powered tool may malfunction and provide inaccurate information or recommendations which can heavily affect the whole educational activities. Besides, it is important for administrators to be aware of these potential dangers and to carefully consider the risks and benefits of using AI-powered tools in planning, administering and supervising school activities. It is important to approach the use of AI in educational management with caution and to be mindful of the potential risks and limitations associated with its use (Fayaz, et al., 2022).

For the fact that AI-powered tools seem to lack human interaction, over-reliance on these tools can lead to unintended consequences that may not be immediately apparent. For example, an AI-powered tool that analyzes student data to predict academic performance may inadvertently reinforce existing biases or lead to over-reliance on standardized testing at the expense of other important educational factors. Furthermore, Fayaz, et al., (2022) argued that the use of AI in educational planning, administration and supervision has raised much ethical concerns related to data privacy, fairness, and transparency. For example, there may be ethical concerns around the collection and use of staff and student data, including the potential for this data to be used for commercial purposes or to reinforce existing inequalities. It has been equally argued that the use of AI in educational administration raised legal liability concerns related to safety and security. For example, if an AI-powered tool is used to monitor student behavior, there may be concerns about the potential for false positives or the accuracy of the data. It is therefore important to be aware of the potential dangers and to approach the use of AI in education with caution by considering the risks and benefits of using AI-powered tools and to ensure that ethical, legal, and privacy concerns are addressed (El-Khatib & Mostafa, 2019).

Going by the contributions of these researchers, this present study is focused on discussing the diffusion of AI and its significance in educational planning, a subset of educational management concerned with the process of setting goals, designing strategies, and implementing policies and programmes to promote and improve education in the future with the available resources. The present study is also anchored on addressing the issues pertaining to the deployment of AI in educational administration and supervision for school goals attainment.

2. LITERATURE REVIEW

2.1 Deployment of Artificial Intelligence in Educational Planning

Educational planning is the systematic process of setting goals, formulating strategies, and making decisions to guide the development and improvement of educational systems, programs, and policies (Abu-Qarn & Abu- Bader, 2018). Artificial Intelligence (AI) can play a significant role in educational planning by analyzing vast amounts of data to identify patterns, trends, and insights that inform decision-making. By leveraging AI algorithms and machine learning techniques, educational planners can gain valuable insights into student performance, learning needs, and educational outcomes (Baker & Siemens, 2014). AI can assist in predicting future demand for educational programs, facilitating effective resource allocation and infrastructure planning (Picciano & Seaman, 2017). Additionally, AI-powered recommendation systems can provide personalized guidance to students regarding course selection, career pathways, and educational opportunities, enhancing the effectiveness of individualized educational planning (Kizilcec et al., 2017). Furthermore, AI can support scenario analysis and modeling, enabling educational planners to simulate the potential impact of different policies and interventions on student outcomes and system performance (Chatti et al., 2018). Thus, the integration of AI in educational planning can

optimize decision-making, enhance student support, and contribute to the development of more effective and efficient educational systems.

2.2 Application of Artificial Intelligence in Educational Administration

Educational administration refers to the management and coordination of educational institutions and systems to ensure effective operation and achievement of educational goals (Lee & Kim, 2018). Artificial Intelligence (AI) can be utilized in educational administration to streamline administrative processes, enhance decision-making, personalize learning experiences, and improve overall educational outcomes. For instance, AI-powered systems can automate administrative tasks such as student enrollment, scheduling, and record-keeping, reducing the burden on administrators and increasing efficiency (Johnson & Smith, 2020). AI can also analyze large volumes of data to provide valuable insights for educational leaders, enabling them to make data-driven decisions regarding resource allocation, curriculum design, and student support services (Brown & Jones, 2019). Additionally, AI-based adaptive learning platforms can tailor educational content and instruction to individual students' needs, facilitating personalized and engaging learning experiences (Wang & Chen, 2021). Lastly, AI can support early identification of students at risk of academic difficulties, enabling timely interventions and support to improve their educational outcomes (Lee & Kim, 2018). Inclusively, the integration of AI in educational administration holds great potential to enhance efficiency, effectiveness, and student success.

2.3 Utilization of Artificial Intelligence in Educational Supervision

Educational supervision refers to the process of overseeing and evaluating educational practices, instructional methods, and professional development of educators to ensure quality teaching and learning within educational institutions (National Center for Education Statistics, 2023). Artificial Intelligence (AI) can be employed for educational supervision to enhance the monitoring and evaluation of instructional practices and provide personalized support to educators. Through AI-powered video analysis, supervisors can efficiently observe classroom interactions and provide feedback for professional development (D'Mello et al., 2017). AI algorithms can analyze student performance data to identify areas of improvement and recommend targeted interventions for educators (Koedinger et al., 2012). AI-based chatbots can offer real-time assistance to teachers, answering their queries and providing resources for instructional improvement (Johnson & Rickel, 2000). Furthermore, AI can assist in automating the assessment and grading process, freeing up time for supervisors to focus on providing meaningful feedback and guidance (Bouckaert et al., 2016). Therefore, the integration of AI in educational supervision can optimize the support and evaluation of educators, fostering continuous improvement in teaching and learning practices.

2.4 Roles of AI-Powered Tools in Educational Administration

Educational administration refers to the management and leadership of educational institutions, including overseeing operations, implementing policies, and ensuring the smooth functioning of the school to support student learning and development (Di-Mitri, Schneider & Drachsler, 2018). AI-powered tools in school administration can automate administrative tasks such as student enrollment, scheduling, and record-keeping, reducing manual workload and increasing efficiency. Additionally, AI can analyze data to provide valuable insights for decision-making, enabling educational administrators to make informed choices regarding resource allocation, curriculum design, and student support services in the following ways:

1. ***Improved accuracy in enrollment forecasting****:* AI-powered tools can analyze historical data on student enrollment, demographic trends, and economic conditions to provide more accurate enrollment forecasts. A study by the National Center for Education Statistics (2023) found that AI algorithms can improve enrollment forecasting accuracy by up to 3%. AI-powered tools can improve accuracy in student enrollment forecasting by analyzing large amounts of historical data on student enrollment, demographic trends, economic conditions and other relevant factors. This data can help identify patterns and relationships that may not be immediately apparent to humans, and provide more accurate predictions of future enrollment.
2. ***Better resource allocation:*** AI can help school administrators optimize the allocation of resources such as funding, staffing, and facilities by analyzing data on student demographics, performance, and behavior. A study by the American Institutes for Research found that AI algorithms can help schools make more informed decisions about resource allocation and improve student outcomes. AI promotes better resource allocation in educational management by analyzing large amounts of data on student demographics, performance, behavior, and other relevant factors, and providing evidence-based insights to help school administrators make more informed decisions about resource allocation (Dalgarno & Lee, 2019)
3. ***Enhanced teacher recruitment:*** AI can help school districts identify and recruit highly qualified teachers by analyzing resumes,

job postings, and social media data. A study by the University of Southern California found that AI algorithms can help identify top candidates and reduce bias in the recruitment process. AI can enhance teacher recruitment in educational management by analyzing large amounts of data on teacher qualifications, job postings, and social media activity, and providing evidence-based insights to help school administrators identify and recruit highly qualified teachers (Dabbagh & Kitsantas, 2018).

4. ***Improved curriculum development***: AI-powered tools can analyze student performance data to identify areas of strength and weakness in the curriculum, and provide recommendations for improvement. A study by the University of Pittsburgh found that AI algorithms can help improve instructional design and support personalized learning. AI can improve curriculum development in educational management by analyzing large amounts of data on student performance, behavior, and interests, and providing evidence-based insights to help educators and administrators develop more effective and personalized curricula. (Cresswell & Burke, 2018).
5. ***More efficient scheduling:*** AI-powered tools can analyze student and teacher schedules, as well as other factors such as transportation and extracurricular activities, to optimize scheduling and reduce conflicts. A study by the University of Illinois found that AI algorithms can significantly reduce the time and resources required for scheduling. AI algorithms can analyze course data, student enrollment data, and faculty availability to create optimized schedules that minimize conflicts and maximize classroom and faculty utilization. This can save time and effort that would otherwise be spent manually scheduling courses. It can help in allocating resources like teachers, classrooms, and equipment, based on demand and availability (Correa & Carlos, 2016).
6. ***Better student retention***: AI-powered tools can analyze student data to identify students who may be at risk of dropping out, and provide targeted interventions to improve retention rates. A study by the University of Virginia found that AI algorithms can help identify at-risk students and improve retention rates by up to 10%. AI can create personalized learning experiences for students by analyzing their learning styles, interests, and performance data. This can help students stay engaged and motivated, which can improve their retention rates. AI-powered early warning systems can detect when a student is struggling and alert teachers and administrators (Chuang & Lin, 2019).
7. ***Improved financial planning***: AI can help school districts forecast revenue and expenses, and identify opportunities for cost savings and revenue growth. A study by the National School Boards Association found that AI-powered financial planning tools can improve budgeting accuracy and reduce the risk of financial crises. AI can analyze historical financial data and predict future trends and patterns, such as enrollment and revenue projections (Chen, Wang & Li, 2019).
8. ***Data visualization*** AI-powered data visualization tools can help school administrators and teachers make sense of complex data sets, and identify trends and patterns that may not be immediately apparent. A study by the University of California, Berkeley found that AI algorithms can improve the accuracy and efficiency of data visualization. AI can analyze large amounts of text data, such as student feedback or survey responses, and extract key insights. These insights can then be presented in a visual form, such as word clouds or sentiment analysis charts, to help educators better understand student needs and preferences. AI-powered interactive dashboards can provide educators with real-time data on key metrics, such as student performance, attendance, and engagement. These dashboards can allow educators to explore data in different ways and gain deeper insights into student behavior and learning outcomes (Chatti, Dyckhoff, Schroeder & Thüs, 2012).
9. ***Improved parental engagement***: AI-powered communication tools can help school districts communicate more effectively with parents, and provide personalized updates on their child's academic progress. A study by the University of Michigan found that AI-powered communication tools can improve parental engagement and satisfaction. AI can be used to send personalized communications to parents based on their child's progress in school. This can include updates on grades, attendance, and behavior. Parents can receive this information in real-time, allowing them to stay informed and engaged in their child's education (Brusilovsky & Peylo, 2003).
10. ***Enhanced accountability***: AI-powered tools can help school districts track and analyze performance data, and provide evidence-based insights into the effectiveness of different programs and initiatives. A study by the RAND Corporation found that AI algorithms can help improve accountability and decision-making in education. AI can be used to analyze large amounts of data, such as student performance, attendance rates, and teacher evaluations. This data can be used to identify trends and patterns, which can be used to inform decision-making and improve accountability (Blikstein, 2019).
11. ***Student Support:*** AI can be used to provide students with personalized support and interventions based on their individual needs. For example, AI-powered systems can provide students with additional resources or support if they are struggling with a particular subject or skill. AI can be used to identify students who may need additional support or intervention early on. By analyzing data on student performance and behavior, AI can help school administrators identify students who are at risk of falling behind academically or socially. This can help school administrators provide early support and intervention to help these students succeed

(Bista & Al-Hmoud, 2020).

12. ***Equity and Inclusion:*** AI can help school administrators ensure that all students are receiving an equitable education that meets their individual needs. By analyzing data on student performance and behavior, AI can help identify disparities in academic achievement and ensure that resources are allocated in a way that supports all students. AI can be used to analyze data on student performance and behavior to identify disparities in academic achievement and disciplinary actions. AI can be used to reduce bias in decision-making processes, such as hiring and disciplinary actions. By analyzing data objectively, AI can help ensure that decisions are made based on evidence rather than implicit biases (Barseghian, 2019).
13. ***Programme Evaluation***: AI can be used to evaluate the effectiveness of educational programs and interventions. By analyzing data on student outcomes and other metrics, AI can help school administrators identify which programs are working well and which may need to be adjusted or discontinued. AI can be used to develop performance metrics for programs based on data analysis. By identifying the key indicators of program success and developing metrics to track them, school administrators can evaluate program effectiveness more accurately and objectively (Atarah, Nsoh, & Selorm, 2023).
14. ***Collaboration:*** AI can be used to facilitate collaboration between teachers, administrators, and other stakeholders. For example, AI-powered systems can provide teachers with access to shared resources and allow them to collaborate on lesson plans and other materials. AI can help school administrators promote collaboration in their schools by facilitating resource sharing, professional learning communities, data sharing, communication, collaboration platforms, project management, and performance management. By using AI to support these efforts, school administrators can create a more collaborative and supportive learning environment for all students (Ayat-Jarat & Hammed, 2018).
15. ***Curriculum Alignment***: AI can be used to align curriculum with state and national standards. By analyzing data on student learning and performance, AI can help school administrators ensure that the curriculum is aligned with the standards and that students are receiving the necessary instruction to meet the standards. Using AI can help school administrators promote curriculum alignment in their schools by mapping the curriculum, developing learning objectives, creating assessment tools, allocating resources more effectively, providing targeted professional development, analyzing learning analytics, and providing feedback mechanisms (AlZoubi & Al-Tarawneh, 2019).
16. ***Student Mobility***: AI can be used to support students who move between schools or districts. By analyzing data on student performance and behavior, AI can help ensure that students receive the necessary support and resources to succeed, regardless of where they are enrolled. using AI can help school administrators enhance student mobility by tracking student movement, planning transportation routes and schedules, developing personalized schedules, improving safety and security, improving accessibility, improving parental communication, and providing personalized support. By using AI to support these efforts, school administrators can create a more efficient and effective learning environment for all students (Almaiah, et al., 2022).
17. ***Virtual Learning***: AI can be used to support virtual learning experiences for students. AI-powered systems can provide students with personalized feedback and support, and help teachers and administrators monitor student progress and engagement. Using AI can help school administrators promote virtual learning by providing adaptive learning experiences, creating and curating educational content, developing and administering assessments, managing virtual classrooms, providing personalized feedback, allocating resources effectively, and providing technical support. By using AI to support these efforts, school administrators can create a more effective and engaging virtual learning environment for all students (Ali & Oscar, 2017).
18. ***Language Learning***: AI can be used to support language learning for students who speak English as a second language. AI-powered systems can provide students with personalized support and feedback on their language skills and help them improve their proficiency. AI can be used to grade student assignments and provide feedback to students and teachers. This can save teachers time and allow them to focus on other aspects of teaching, while also providing students with immediate feedback on their work. AI can be used to develop language learning apps that use machine learning algorithms to adapt to the individual needs of each student. These apps can provide personalized learning plans, practice exercises, and feedback to help students improve their language skills (Al-Hmoud & Al-Samarraie, 2019).
19. ***Curriculum Customization***: AI can be used to customize the curriculum based on student needs and interests. By analyzing data on student performance and behavior, AI can help teachers and administrators identify which topics and activities are most engaging and effective for students. One way AI can achieve this is through adaptive learning algorithms that can analyze student performance data and adjust the curriculum to meet individual needs. These algorithms can identify areas where students are struggling and provide additional resources or instruction to help them catch up. By analyzing student data and identifying patterns, AI can help teachers identify areas where students need additional support and suggest teaching strategies or resources to address those needs (Ahmad, et al., 2021).
20. ***Teacher-Student Matching***: AI can be used to match students with teachers based on their learning styles and needs. By analyzing

data on student learning and behavior, AI can help school administrators identify which teachers are best matched to which students. One way AI can achieve this is through data analysis. AI can also analyze personality traits and learning preferences to identify compatible teacher-student matches. By analyzing student data on personality traits and learning preferences, AI can identify teachers who have similar traits and preferences. For example, if a student is highly organized and prefers structured learning environments, AI can suggest teachers who exhibit those same traits and who have a teaching style that aligns with those preferences (Ackerson & Subramanian, 2016).

21. ***Teacher Performance Management***: AI can be used to evaluate teacher performance and provide feedback and support. By analyzing data on teacher performance and student outcomes, AI can help school administrators identify areas where teachers may need additional support or professional development. AI can help school administrators optimize resource allocation by identifying areas where additional support may be needed. By providing personalized support, teachers can improve their skills and ultimately enhance student outcomes (Abu-Qarn & Abu- Bader, 2018).

3. LARGE-SCALE ALGORITHMS IN THE DEVELOPMENT OF AI MODELS FOR EDUCATIONAL ADMINISTRATION

In the context of AI, large-scale algorithms are algorithms that are designed to handle massive amounts of data and complex computations. These algorithms are often used in the development of large-scale machine learning models, such as deep neural networks, which require significant computational resources and extensive training data to achieve high levels of accuracy (Zhang, 2019). Large-scale algorithms are used to optimize the parameters of machine learning models during the training process. One example of a large-scale algorithm used in AI is stochastic gradient descent, which is used to optimize the weights of a neural network during training by iteratively adjusting the weights based on the error between the predicted output and the actual output (Zawacki-Richter, et. Al., 2019).

Another example of a large-scale algorithm used in AI is back propagation, which is used to calculate the error gradients in a neural network and update the weights of the network during training (Zawacki-Richter, et. Al., 2019). Back propagation is a key algorithm in the development of deep neural networks, which are used for a wide range of applications such as computer vision, natural language processing, and speech recognition. Zawacki-Richter and Naidu (2016) stressed that large-scale algorithms are essential for the development of AI models, particularly in the field of deep learning, where large-scale models are used for a wide range of applications that require the processing of vast amounts of data. These algorithms allow AI models to be trained on massive datasets and achieve high levels of accuracy, making them a valuable tool for solving complex problems in a variety of industries.

Some examples of some commonly used large-scale algorithms in the field of AI for educational planning, administration and supervision. They are but not limited to Stochastic Gradient Descent (SGD), Back propagation, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), Random Forest, Gradient Boosting, K-Means Clustering, Principal Component Analysis (PCA), Deep Belief Networks (DBNs), Generative Adversarial Networks (GANs), Support Vector Machines (SVMs), Boltzmann Machines, Auto encoders and Deep Reinforcement Learning among others (Yawo & Amouzou, 2019). The unique capabilities of large-scale algorithms make them valuable tools for a wide range of applications across many different industries, including finance, healthcare, transportation, and manufacturing. They can engage in interactive and dynamic conversations with educational administrators, respond to queries, provide vital information, and generate relevant and coherent responses. These specialized form of AI are trained to understand context, tone, and style, making them capable of generating texts, and closely mimics-human like conversations in educational planning, administration and supervision. The choice of algorithm depends on the specific task at hand and the characteristics of the data being used (Yu & Wang, 2019). Large-scale algorithms are particularly useful for tasks that involve vast amounts of data and complex computations, such as image recognition, natural language processing, and speech recognition (Xue & Wang, 2022). Large scale algorithms can play a significant role in various stages of educational management processes in terms of planning, administration and supervision. They can be applied in educational planning in terms of needs assessment, goal setting, strategy development, implementation, monitoring, evaluation, revision and improvement. They can equally be useful in educational administration in terms of forecasting, organising, staffing, controlling, directing, coordinating and budgeting. Large-scale algorithms can also be applied in educational supervision in terms of preparation, observation, feedback, support, evaluation and follow-up. Further extrapolations on the usefulness of large-scale algorithms in educational planning, administration and supervision are well documented (Xuesong, et. Al., 2021) in terms of:

Educational Needs Assessment

This includes identifying the educational needs of the target population, including the skills and knowledge they need to acquire,

the resources required, and the challenges and opportunities that exist in the educational environment. AI can be used to analyze student data and provide insights into learning patterns and trends (Uzoigwe, Ibas & Chuktu, 2021). This can help teachers and administrators identify areas where students may need additional support. AI can be used to analyze student data and make predictions about future performance. For example, AI can be used to identify students who are at risk of failing a course or dropping out of school and provide early interventions to help them. AI can be used to develop and administer surveys and assessments to students, teachers, and administrators.

Educational Goal Setting

This involves defining the overall objectives and specific goals of the educational program or system, such as improving student learning outcomes, increasing access to education, or enhancing the quality of teaching. AI can be used to analyze student data and develop personalized learning plans based on individual strengths and weaknesses. This can help students set and achieve specific learning goals (Tuomi, 2018). AI can be used to create adaptive learning environments that adjust to the student's learning pace and preferences. The system can use data to identify areas where the student needs more practice and provide targeted feedback to help them achieve their learning goals.

Educational Strategy Development

This comprises identifying appropriate strategies and interventions that can be used to achieve the defined goals, such as curriculum development, teacher training, infrastructure development, or student support services (Siemens & Baker, 2012). AI can be used to make predictions about future trends and outcomes. This can be useful in developing strategies that are tailored to the needs of students and educators.

Educational Resource Mobilization

This involves identifying and securing the resources necessary to implement the educational plan, such as financial resources, personnel, and materials. AI can be used to analyze student data and identify trends and patterns (Spector, et al. 2019). This can help educators identify areas where improvements can be made and develop strategies to address those areas.

Educational Plan Implementation

This embroils putting the educational plan into action, including the deployment of resources, the execution of strategies, and the monitoring of progress towards the defined goals (Siemens, 2013; Siemens & Baker, 2012). AI-powered tutoring systems can provide students with real-time feedback and support, helping them to understand difficult concepts and improve their skills.

Setting Goals

This encompasses defining the overall objectives and specific goals of the educational institution or system, such as improving student learning outcomes, increasing access to education, or enhancing the quality of teaching (Shum & Ferguson, 2012).

Educational Planning

This comprises developing a comprehensive plan to achieve the defined goals, including identifying the required resources, developing timelines, and setting clear responsibilities and accountability mechanisms (Romero & Ventura, 2010; Peron, 1988). AI can be used to predict future outcomes based on historical data. For example, educational planners can use AI algorithms to predict student enrollment rates, identify areas where teacher shortages may occur, or forecast budget requirements.

Organizing

This contains creating a structure that supports the plan and facilitates the achievement of the defined goals. This may include creating job descriptions, delegating responsibilities, and establishing reporting and communication channels (Pedró, et al. 2019). AI can help automate the process of creating schedules and timetables for classes, teachers, and other school activities. By analyzing data on teacher availability, student needs, and other factors, AI algorithms can create optimized schedules that minimize conflicts and maximize efficiency.

Staffing

This includes identifying the required personnel and recruiting, hiring, and training them to ensure that they have the necessary

skills and knowledge to fulfill their roles effectively. Pardo, et al., (2019) suggested that AI algorithms can help screen resumes and applications, identify qualified candidates, and even conduct initial interviews. This can save time and resources for school administrators and help identify the best candidates for open positions.

Directing

This encompasses providing guidance and support to the staff to help them achieve the defined goals, including providing feedback, coaching, and mentoring. AI can help school administrators develop and implement strategic plans by analyzing data on student performance, resource allocation, and other factors. Oyewole (2019) found that this can help identify areas where improvements are needed, predict future trends and outcomes, and inform decisions about resource allocation and program development.

Controlling

AI can help detect and prevent fraud in school management by analyzing data on financial transactions, procurement, and other activities. Osterwalder, Pigneur, Bernarda and Smith (2014) suggested that by identifying patterns and anomalies in the data, AI algorithms can alert school administrators to potential fraud and help prevent financial losses. AI can help manage risks associated with school management by analyzing data on safety, security, and other areas. For example, AI algorithms can analyze data on student behavior to identify potential safety risks, or analyze data on school infrastructure to identify potential maintenance issues.

Evaluating

This implicates assessing the effectiveness of the plan and making any necessary adjustments to achieve the desired outcomes. Olufemi and Skinnier (2018) elucidated that it also involves measuring progress towards the defined goals and identifying any gaps or challenges that need to be addressed. AI algorithms can be trained to automatically grade student assignments, such as multiple-choice tests or essays. This can save teachers a significant amount of time and help ensure consistency in grading.

Communicating

This involves establishing clear lines of communication with stakeholders, such as students, parents, staff, and the wider community, to ensure that they are informed about the activities and progress of the educational institution or system. Olufemi and Skinnier (2018) opined that AI-powered Chatbots can be used to provide customer service or support for a business or organization. They can answer common questions, provide information, and help users navigate a website or application.

Continuous Improvement

This involves using the results of evaluation and feedback to continuously improve the educational administration, making it more effective and efficient over time. It also involves adapting to changing needs and circumstances to ensure that the educational system remains relevant and responsive to the needs of the stakeholders. Nouri and Cedeño-Maldonado (2018) insisted that AI can be used to analyze data and make predictions about future outcomes.

Observation

This consists of observing the teaching and learning process to identify strengths and weaknesses and assess the effectiveness of teaching methods and strategies. AI can be used to analyze video footage to identify patterns or objects within them. Mario (2023) stressed that this can be useful in fields like security, where AI can be used to detect potential threats or suspicious behavior in real-time. AI can be used to analyze data from sensors, such as temperature, humidity, or air quality sensors. This can be useful in fields like agriculture, where AI can be used to optimize crop yields by analyzing environmental factors.

Feedback

This entails providing feedback to teachers about their performance, highlighting areas of strength and areas for improvement, and providing suggestions for enhancing teaching effectiveness. AI can be used to provide automated feedback on assignments or assessments. For example, an AI-powered essay grader can provide students with feedback on their writing skills, including grammar, structure, and content (Mario, 2023).

Professional Development

This includes identifying the training and support needs of teachers and providing appropriate professional development opportunities to improve teaching quality and effectiveness. Manic, Romer and Well (1992) expounded that AI can be used to analyze

employee performance data to identify areas for improvement and provide recommendations for professional development.

Data Analysis

This involves analyzing data on student performance, teacher effectiveness, and other relevant metrics to inform decision-making and identify areas for improvement. AI can be used to analyze and understand human language. Ma, et al., (2014) explained that this can be useful in analyzing customer feedback, social media posts, or written survey responses. AI can be used to analyze images and videos to identify patterns or objects within them. This can be useful in fields like medicine, where AI can be used to analyze medical images to identify potential health issues.

Action Planning

This comprises developing an action plan to address identified areas for improvement, including setting specific goals, identifying necessary resources, and establishing a timeline for implementation. Luan and Zhao (2019) argued that AI can be used to analyze student data and develop personalized learning plans based on individual strengths and weaknesses. This can help teachers tailor their instruction to meet the needs of each student.

Monitoring and Evaluation

This involves monitoring the progress towards the defined goals and evaluating the effectiveness of the action plan, making any necessary adjustments to achieve the desired outcomes. AI can be used to analyze student data and provide insights into learning patterns and trends. This can help teachers and administrators identify areas for improvement and develop personalized learning plans (Luque & Peláez, 2018).

4. ROLES OF PRINCIPALS IN ARTIFICIAL INTELLIGENCE-BASED EDUCATIONAL ADMINISTRATION

AI is unlikely to completely replace school administrators in the near future. While AI can assist administrators in performing routine tasks such as data analysis, schedule management, and communication with stakeholders, it cannot fully replace the human skills and judgment required to lead a school community (Kukulska-Hulme & Shield (2018). School administrators perform a wide range of duties that require complex decision-making, interpersonal skills, and leadership abilities. For example, administrators are responsible for setting the vision and goals for the school, managing staff and resources, addressing student needs and concerns, and engaging with parents and community members. These tasks require a high level of emotional intelligence, critical thinking, and adaptability, which are not yet fully replicable by AI (Li & Bryson, 2017).

Moreover, school administrators play a critical role in creating a positive and supportive school culture, which is essential for student success. They provide mentorship and guidance to teachers and staff, foster relationships with families and community members, and create a safe and inclusive learning environment (Liu, et., 2020). These tasks require a level of human interaction and empathy that cannot be fully replicated by AI. While AI can assist school administrators in performing certain tasks, it is unlikely to fully replace them in the near future. School administration requires a range of complex skills and abilities that are currently best fulfilled by human administrators. In an AI-based school management system, school administrators play a critical role in ensuring that the technology is used effectively and ethically (Lou & Xu, 2019). Some of the possible roles of school administrators in an AI-based school management system include:

1. Planning and Implementing: School administrators are responsible for planning and implementing the AI-based school management system. Kim and Bonk (2022) argued that this involves identifying the needs of the school, selecting appropriate AI technologies, and overseeing the implementation process.

2. Data Management: School administrators are responsible for managing the data that is collected and analyzed by the AI system. Kennedy and McNaught (2016) clarified that this encompasses ensuring that the data is accurate, secure, and used ethically.

3. Staff Training: School administrators are responsible for ensuring that staff members are trained to use the AI-based school management system effectively. Kebritchi and Hirumi, (2018) explained that this comprises providing training on how to use the system, as well as on data management and ethical considerations.

4. Decision-Making: School administrators use the insights provided by the AI system to make informed decisions about resource allocation, program development, and other key areas. They must ensure that these decisions are based on accurate and reliable data, and that they align with the mission and goals of the school (Kashif, et al., 2023).

5. Ethical Considerations: School administrators must ensure that the use of AI in school management is ethical and aligns with the values of the school. Karsenti and Bugmann (2019) opined that this involves considering issues such as data privacy, fairness, and accountability, and developing policies and procedures to address these concerns.

6. Planning and Implementing: School administrators are responsible for planning and implementing the AI-based school management system. This entails identifying the needs of the school, selecting appropriate AI technologies, and overseeing the implementation process (Karpatne, et al., 2018).

7. Data Management: School administrators are responsible for managing the data that is collected and analyzed by the AI system. This embroils ensuring that the data is accurate, secure, and used ethically (Kang & Kim, 2021).

8. Staff Training: School administrators are responsible for ensuring that staff members are trained to use the AI-based school management system effectively (Jonassen & Kim, 2017). This encompasses providing training on how to use the system, as well as on data management and ethical considerations.

9. Decision-Making: School administrators use the insights provided by the AI system to make informed decisions about resource allocation, program development, and other key areas. They must ensure that these decisions are based on accurate and reliable data, and that they align with the mission and goals of the school (Ismail, Muhterem, Hanni & Sanna, 2022).

10. Ethical Considerations: School administrators must ensure that the use of AI in school management is ethical and aligns with the values of the school. Jang (2019) suggested that this involves considering issues such as data privacy, fairness, and accountability, and developing policies and procedures to address these concerns.

5. CHALLENGES OF USING ARTIFICIAL INTELLIGENCE-POWERED TOOLS IN EDUCATIONAL ADMINISTRATION

Some details on the challenges of using AI-powered tools in educational planning, administration, and supervision are enlisted below but limited to:

1. Data Quality: AI algorithms rely heavily on data to make predictions and recommendations. Ensuring data quality is vital, as poor quality or biased data can result in inaccurate or unfair insights. Additionally, data must be collected in a way that respects student privacy and confidentiality (Igbokwe, 2023).

2. Ethical Concerns: The use of AI in education raises ethical concerns such as data privacy, fairness, and accountability. For example, using student data to train AI algorithms may raise concerns about privacy and data protection. Hwang and Chen (2018) emphasized that there is also a risk that the use of AI could exacerbate existing inequities in the education system, such as by perpetuating biases or unfairly targeting certain groups of students.

3. Technical Complexity: Implementing and maintaining AI-powered tools can be technically complex and require specialized technical expertise. Schools administrators may need to invest in training or hiring staff with the necessary technical skills to implement and maintain these tools (Huang, Yang, Liang & Chiu, 2019).

4. Resistance to Change: Introducing new technologies like AI can be met with resistance from stakeholders who may be skeptical or concerned about the impact on their roles. Huang and Li (2019) lamented that this resistance can make it difficult to gain support for these tools and to integrate them effectively into existing workflows.

5. Cost: AI-powered tools can be expensive, particularly for schools and districts with limited budgets (Hershkovitz & Nachmias, 2018). This can make it difficult to justify the investment, particularly if the benefits are not immediately apparent.

6. Lack of Understanding: There may be a lack of understanding among educators and administrators about how AI works and what its potential benefits and limitations are. This can make it difficult to effectively implement and use AI-powered tools (Han, 2018).

7. Limited Availability of Data: In some cases, there may be limited availability of data that is needed to train AI algorithms. This can make it difficult to develop accurate and reliable insights (Gao, Wu & Zhang, 2019).

8. Difficulty Interpreting Results: AI-powered tools can generate complex results that may be difficult to interpret (Gašević, et al., 2019). This can make it challenging for educators and administrators to make informed decisions based on these insights.

9. Incomplete Data: In some cases, the data used to train AI algorithms may be incomplete. This can result in inaccurate or unreliable insights (Fayaz, et al., 2022).

10. Bias: AI algorithms can perpetuate bias if they are trained on biased data, or if the algorithms themselves are biased. El-Khatib and Mostafa (2019) indicated that this can result in unfair or inaccurate insights that may perpetuate existing inequities in the education system. To overcome these challenges, schools administrators must develop clear policies and procedures for using AI, invest in staff training and development, and work to build trust and collaboration among stakeholders.

6. STRATEGIES TO ADDRESS THE CHALLENGES OF USING ARTIFICIAL INTELLIGENCE IN EDUCATIONAL ADMINISTRATION

There are some strategies that can help to address the challenges of using Artificial Intelligence in educational planning, administration, and supervision:

1. Develop Clear Policies and Procedures: Developing clear policies and procedures for using AI can help to ensure that these tools are used effectively and ethically. Dogan, Dogan and Bozkurt (2023) alluded that these policies should address issues such as data privacy, bias, and accountability, and should be developed in collaboration with educators, administrators, and other stakeholders.

2. Invest in Staff Training and Development: Schools and districts should invest in staff training and development to ensure that educators and administrators have the necessary skills and knowledge to effectively use AI-powered tools. This can include training on data analysis, AI algorithms, and ethical considerations (Dillenbourg & Jermann, 2017).

3. Foster Collaboration and Trust: Building collaboration and trust among stakeholders is essential for the effective use of AI in education (Di-Mitri, Schneider & Drachsler, 2018). This can involve engaging with educators, administrators, students, and parents to ensure that everyone understands the benefits and limitations of AI-powered tools, and to address any concerns or questions.

4. Ensure Data Quality: Ensuring data quality is critical for the effective use of AI in education. Schools and districts should establish clear data collection and management protocols to ensure that the data used to train AI algorithms is accurate, complete, and representative of the student population (Dalgarno & Lee, 2019).

5. Address Ethical Concerns: Addressing ethical concerns is essential for the effective and ethical use of AI in education. Dabbagh and Kitsantas (2018) emphasized that this can involve developing clear guidelines for data privacy and protection, ensuring that AI algorithms are transparent and accountable, and addressing potential biases in the data or algorithms used.

6. Pilot Test AI Tools: Piloting AI-powered tools in a small scale can help to identify potential issues and challenges, and to refine the tools before scaling up. This can also help to build support and trust among stakeholders (Cresswell & Burke, 2018).

7. Ensure Accessibility: Ensuring that AI-powered tools are accessible to all students, regardless of their background or abilities, is essential for promoting equity in education (Correa & Carlos, 2016). This can comprise ensuring that the tools are available in multiple languages, are designed with accessibility in mind, and are used in a way that is inclusive and responsive to diverse student needs.

8. Collaborate with Industry Experts: Collaborating with industry experts can help schools and districts to stay up-to-date on the latest AI technologies and best practices. This can involve partnering with AI vendors, attending conferences and workshops, and engaging with experts in AI and education (Chuang & Lin, 2019).

9. Foster a Culture of Innovation: Fostering a culture of innovation can help to promote the effective use of AI in education. Chen, Wang and Li (2019) opined that this can involve providing resources and support for educators and administrators to experiment with new AI-powered tools and approaches, and celebrating successes and lessons learned.

10. Engage with Students and Parents: Engaging with students and parents can help to ensure that the use of AI in education is responsive to their needs and priorities. Chatti, Dyckhoff, Schroeder and Thüs (2012) argued that this can involve soliciting feedback on the use of AI-powered tools, involving students and parents in the development of policies and procedures, and providing clear and transparent communication about the use of AI in education.

11. Address Technical Complexity: Addressing the technical complexity of AI-powered tools is essential for ensuring their effective use in education. Brusilovsky and Peylo (2023) suggested that this can involve investing in technical infrastructure and support, providing training and resources for staff, and partnering with technical experts to ensure that the tools are implemented and maintained effectively.

12. Ensure Interoperability and Data Integration: Ensuring interoperability and data integration is essential for the effective use of AI-powered tools in education. Bista and Al-Hmoud (2020) emphasized that this can involve developing clear data integration protocols, ensuring that data is collected and managed in a standardized and consistent way, and partnering with vendors and other stakeholders to ensure that the tools are interoperable and compatible with existing systems.

13. Monitor and Evaluate the Use of AI: Monitoring and evaluating the use of AI-powered tools is essential for ensuring their effectiveness and identifying areas for improvement. Blikstein (2019) explained that this can involve collecting and analyzing data on the use of the tools, soliciting feedback from stakeholders, and using the insights gained to refine policies, procedures, and practices.

Addressing the challenges of using AI in educational planning, administration, and supervision requires a multi-faceted approach that involves collaboration, innovation, engagement, technical support, interoperability, and evaluation. Barseghian (2019) asserts that by taking a comprehensive approach, schools and districts can ensure that AI-powered tools are used effectively and ethically to support student learning and success.

7. CONCLUSIONS

Conclusively, this paper has examined the various applications of AI in educational planning, administration, supervision and the challenges which must be addressed to effectively utilize AI. The fact is that using AI in planning, administering and supervising the school system is fraught with strength and weaknesses. On the one hand, AI-based educational planning, administration and supervision can be used to provide personalized and adaptive learning experiences for students. AI can be used to improve parent engagement by providing parents with real-time updates on their child's progress and allowing them to communicate with teachers more easily. AI can be used to match students with teachers based on their learning styles and needs and can be used to customize the curriculum based on student needs and interests. By analyzing data on student performance and behavior, AI can help teachers and administrators identify which topics and activities are most engaging and effective for students. This does not imply that AI has taken over human jobs.

In other words, AI-powered tools can generate complex results that may be difficult to interpret. This can make it challenging for educators and administrators to make informed decisions based on these insights. AI algorithms can perpetuate bias if they are trained on biased data, or if the algorithms themselves are biased. This can result in unfair or inaccurate insights that may perpetuate existing inequities in the education system. Therefore, while AI can enhance educational supervision, it must be aided with human judgement and ethical considerations for optimum results. The process of using AI tools in educational planning, administration and supervision might present several challenges, there are various ways to handle these challenges, and including incorporating human input, oversight and addressing the technical complexity of AI-powered tools is essential for ensuring their effective use in education. This can involve investing in technical infrastructure and support, providing training and resources for staff, and partnering with technical experts to ensure that the tools are implemented and maintained effectively.

Therefore, educational planners, administrators, supervisors, policy makers and all the relevant critical stakeholders must collaboratively develop a functional mechanism of maximizing the benefits of AI-enabled tools in school administration while taking cognisance of the related risk factors. AI in educational planning, administration and supervision would enhance the managerial skills of school administrators and equip them with the digital strategies needed to effectively and efficiently pilot the affairs of a school organisation in this AI era.

Contribution to the Literature

This article expands the frontiers of knowledge of how AI can be deployed in educational planning, administration and supervision in different stages such as organising, directing, coordinating, staffing and budgeting. The article equally contributes to literature by emphasizing the strategies for addressing the challenges associated with AI integration in school administration.

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