

Assessing the Impact of AI Generative Tools on Administrative and Supervisory Practices in Education

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Abstract – This systematic literature review investigates the impact of AI-generative tools on educational administration and supervision. The study used a systematic literature review and a meta-synthesis to synthesize existing studies to understand the utilization, benefits, and challenges of AI tools in educational settings. Central to this review is the exploration of optimal practices for AI deployment in school leadership. Key findings reveal that while AI tools offer considerable advantages, including enhanced operational efficiency and data-driven decision-making, they also present challenges such as ethical concerns and the need for specialized training. The study concludes with a call for a balanced integration of AI in education, emphasizing continuous evaluation and a collaborative approach for effective utilization in administrative and supervisory practices.

Keywords – Artificial Intelligence, AI Generative Tools, Administration and Supervision, Supervisory Practices, Technological Integration

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INTRODUCTION

Educational administration and supervision are undergoing a significant transformation, which is mainly driven by the introduction of artificial intelligence (AI) generative tools. The administrative supervisory practices in education pertaining to the range of

processes, strategies, and activities involved in the management and governance of educational institutions. Administrative practices in education include, but are not limited to, strategic planning, policy formulation, resource allocation, regulatory compliance, and staff management. Supervisory practices, on the other hand, often focus on overseeing educational processes, such as curriculum implementation, teacher performance, student assessment, and quality assurance [1].

This literature review endeavors to understand how these advanced tools may fundamentally redefine administrative and supervisory methodologies. The focus extends beyond technological adoption but also on its congruence with educational objectives, thereby assessing the intersections of AI and supervisory and administrative practices. The integration of AI into school supervision and administration signifies a paradigmatic shift in the way educational institutions explore its potential to enhance operational efficiency.

More importantly, this study focused on understanding the impact of AI on educational administration and supervision. Impact pertains to the effects or changes that arise from the integration of AI-generative tools in school supervisory and administrative practices [2]. AI-generative tools are sophisticated software applications that use artificial intelligence, particularly machine learning algorithms, to create or generate new content, decisions, or predictions based on provided data. In the context of school administration, these tools might include AI-driven data analysis systems powered by AI, predictive analytics for student performance, automated scheduling software, and AI-enabled communication platforms [3].

Moreover, studies stressed the AI's capacity to automate routine administrative tasks [4] and the problematic challenges linked with integrating AI into educational leadership [5]. In addition, studies explored the impact of decision-making in educational leadership in utilizing AI [6][7]. Moreover, studies examined the transformative impact of AI on conventional administrative positions [8][9]. On the other hand, studies explored on creative applications of generative AI in organizational and management [10][11]. In addition, a study provided a crucial foundational view by investigating the perspectives of educators regarding the integration and implementation of AI in the field [12].

The significance of this systematic review is that it provides educational practitioners, administrators, and policymakers with a comprehensive understanding of AI's integration in educational environments. It critically assesses the perceived benefits and challenges that AI presents, emphasizing its functionalities and potential to improve operational efficiency in educational institutions. Furthermore, it strives to balance the technical abilities of AI with the indispensable human elements in education. By examining these aspects, the review aims to offer insights into the effective deployment of AI tools, ensuring they serve as a boon rather than a bane in educational contexts. Furthermore, the significance of AI in increasing the effectiveness of tasks like scheduling and resource allocation [4]. The balance between AI assistance and human judgment in decision-making when integrating AI into school leadership [5][6][7]. In contrast, a study explored the significance of considering educators' views for effective AI implementation in supervisory roles [12]. AI encompasses a spectrum of learning, including machine learning, representation learning, deep learning, and natural language processing [13]. In the context of decision-making, AI is increasingly employed to analyze data and support decision-making processes [14]. The integration of AI and optimization is imperative for devising data-driven and intelligent decision support systems [15]. Furthermore, AI can efficiently retrieve and analyze massive amounts of data to assist in making data-driven, evidence-informed decisions [16]. This compilation of studies illustrates both the encouraging potential and the challenges of AI in transforming educational administration and supervision.

OBJECTIVES OF THE STUDY

The goals center around assessing the impact of AI on educational practices, its benefits, functionality, and the challenges it presents for academic establishments.

Through a meticulous analysis of these themes, the review endeavours to create a path towards the integration of AI in educational leadership, paralleling to technological advancements with the core principles and goals of education.

MATERIALS AND METHODS

This study utilized a systematic review and meta-synthesis to analyze the specified topic. This method is valuable in synthesizing qualitative investigations, where it integrates and interprets findings from multiple studies to draw a more complete conclusion [17]. The research instrument used in this study has been validated in earlier works, demonstrating its reliability for measuring the intended variables. The LLAMA-2 model, utilized for automated thematic acquisition, has been validated in prior research and selected for its proven accuracy and reliability in extracting and analyzing thematic data. This model has been proven effective in extracting thematic information from very high-resolution remote sensing imagery, making it a suitable choice for automated thematic acquisition due to its accuracy and reliability [18].

Data Sources

The review utilized diverse sources for comprehensive coverage, including databases like PubMed and Google Scholar for scholarly articles and reports from organizations such as UNESCO and the World Bank. It also considered the latest updates from reputable technology journals and websites on AI tools in education and related to administrative and supervisory practices.

Search Strategies

A detailed search approach was used, combining specific keywords related to AI and education with Boolean operators to refine results. A snowball sampling method was also employed to discover additional relevant literature by reviewing reference lists of initial finds. The focus was on literature from the last ten years, and only English-language sources were considered. The following combination of keywords had been utilized in gathering literatures relevant to this study such as "AI, administration, supervision, AI generative tools, impact of AI in educational administration, perceived benefits of AI in administration and supervision, functionality of AI in Generative tools in education, challenges of AI integration in administration and supervisory practices in education".

Inclusion and Exclusion Criteria

The inclusion criteria were strictly defined to focus on studies directly relevant to AI generative tools in educational settings, particularly those addressing administrative and leadership roles. Studies had to be recent (within the last 10 years) and published in reputable venues. Exclusion criteria ruled out non-educational sectors, outdated research, non-AI technologies, impacts solely on student learning, non-English publications, and non-peer-reviewed materials.

Screening and Selection Process

A two-stage screening was conducted to ensure the relevance and quality of sources, starting with an examination of titles and abstracts, followed by a full-text review.

Data Extraction Process

This phase involved identifying and organizing key information from each source using thematic coding—a qualitative analysis method to identify patterns within data. A standardized template was used for data extraction, focusing on AI tool types, applications, and associated benefits and challenges. The thematic coding process included initial coding, theme refinement, and the development of a comprehensive thematic analysis report.

Thematic Coding Process

When the data extraction process is completed, the initial coding phase commences. This stage involves thoroughly reading through the extracted data and assigning preliminary codes to specific text segments. These initial codes are designed to encapsulate fundamental elements that are pertinent to our research questions, such as "benefits of AI tools" and "challenges in implementation."

Thematic Acquisition Programmatically

Utilizing machine learning (specifically the LLAMA-2 model), the process programmatically analyzed reference lists to identify key themes and concepts, which were then matched against the themes extracted from the data to ensure alignment and relevance.

RESULTS AND DISCUSSION

This section provides a comprehensive assessment of AI generative tools along with educational administration and supervision. This explored the impact of AI on educational practices, emphasizing how these

technologies are reshaping traditional methodologies. Subsequently, it also examined the perceived benefits of AI, including its potential to enhance efficiency and decision-making in administrative tasks. Moreover, the functionality of AI-generative tools was also analyzed, illustrating their role in streamlining educational processes. Lastly, this also studies the challenges associated with integrating AI into academic settings, identifying barriers, and proposing solutions to align AI advancements with the core values and objectives of education.

(a) Impact on Educational Practices

The integration of AI tools in educational administration has significantly transformed administrative processes, curriculum planning, implementation, and evaluation. AI has introduced practical changes in teaching methods and administrative tasks, suggesting a shift from traditional approaches to more efficient, AI-driven processes [8]. Similarly, the challenges and opportunities presented by AI in human resource management within educational settings, indicating a move towards automation and data-driven decision-making [9]. Moreover, tools like ChatGPT in education reveals the transformational change of educational practices, emphasizing the necessity for strategic integration of AI tools [21].

This literature offers an important transformation in educational leadership roles, with AI acting as an agent for enhancing administrative efficiency, curriculum development, and supervisory practices. By leveraging AI, educational leaders can address traditional challenges more effectively, ensuring alignment with the core objectives of educational administration and supervision, thereby fulfilling the study's objective number 1.

AI's impact on educational administration is profound, particularly in streamlining operations and enhancing management efficiency. A study explored the policy recommendations for AI integration [22]. In addition, AI's practical applications in educational workplaces, illustrate the operational efficiencies gained through AI [23]. These efficiencies are manifested in automated data management, optimized scheduling, and improved communication channels. Moreover, a study explored on the managerial implications of AI in education further supports the concept that AI can paradoxically challenge and enrich educational reform efforts [24]. The integration of AI offers a pathway to transforming administrative tasks, making them more efficient and less prone to human error.

AI's role in personalizing education and providing sophisticated support for students and teachers has a significant impact on educational practices. A study discussed the direct impacts of AI tools like ChatGPT on teaching strategies [25]. On the other hand, a study explored AI's enhancement of research supervision in higher education [26]. Additionally, generative AI in educational settings emphasizes the capability of AI to offer real-time feedback to teachers, thereby making education more effective and designed to individual student needs [27]. This personalization extends beyond instructional methods to intelligent tutoring systems and adaptable learning pathways, as discussed in the broader implications of AI on education [28].

These reveal that AI's capacity to support personalized learning and instructional methodologies stresses the necessity of integrating AI into educational leadership and supervision to foster an environment that supports adaptive learning and teaching efficiency.

(b) Perceived Benefits of AI in Administration and Supervision

The integration of artificial intelligence (AI) tools within educational administration significantly revolutionizes administrative operations, curriculum design, implementation, and evaluation processes. Research emphasizes the transformative role of AI in educational practices. AI tools have been instrumental in introducing practical changes to teaching methods and administrative tasks, leading to a departure from traditional methods towards more efficient, AI-driven processes [29]. Additionally, challenges and opportunities arising from AI applications in human resource management within educational settings are discussed, indicating a trend towards automation and data-driven decision-making [20]. A systematic review of the use of tools like ChatGPT in education points-out the transformative effect on educational practices, stressing the importance of strategically integrating AI tools [21].

These studies collectively emphasize the crucial role of AI in enhancing educational leadership roles, streamlining administrative efficiency, and facilitating curriculum development. By adopting AI, educational leaders can effectively tackle conventional challenges, aligning practices with the primary goals of educational administration and supervision. It shows that AI's profound impact on operational streamlining and management efficiency in education is evident. Insights into AI's application, as well as policy recommendations for its integration, illustrate the operational benefits achieved through automated data management,

optimized scheduling, and enhanced communication [22][23]. Furthermore, the duality of AI's role is explored, as is its capacity to both challenge and enrich educational reform efforts through a transformation in administrative tasks [24].

Additionally, AI significantly influences personalized education and sophisticated support for both students and teachers. It aids in the direct impact on teaching strategies and the enhancement of research supervision in higher education [25][26]. AI's ability to provide real-time feedback, thereby designing education to meet individual student needs and making it more effective [27]. This level of personalization, extending to intelligent tutoring systems and adaptable learning pathways, provide the broader implications of AI on education [28]. These revelations show the crucial need for integrating AI into educational leadership and supervision, fostering an environment conducive to adaptive learning and teaching efficiency, and thus reinforcing the necessity of AI in educational transformations.

(c) Functionality of AI Generative Tools in Education

AI generative tools have revolutionized the creation and assessment of educational content [30][31][32]. These tools, such as ChatGPT, DALL·E, and BlenderBot, extend beyond mere technological advancements, fundamentally altering the educational framework by offering immediate, diverse options for content creation. However, this transformation is accompanied by challenges, including issues of plagiarism and bias, necessitating a re-evaluation of student assessment methods in the AI era, as discussed in This study shows the necessity for educational systems to adapt to these changes, ensuring that AI integration enhances teaching and learning while addressing ethical concerns. By assessing AI's functionality in education, it becomes evident that these generative tools offer both significant opportunities and challenges, requiring a balanced approach to leverage their potential effectively.

In both pre-K-12 education and higher education, AI generative tools are transitioning from auxiliary aids to central components of the educational framework, as observed by [33][34][19]. These tools not only assist in reducing workloads and enhancing efficiency but also integrate into curricula, transforming traditional teaching methodologies. Incorporating AI directly into educational programs illustrates the growing recognition of AI's inevitability in higher education [35]. This

evolution reflects a broader acceptance and integration of AI technologies, suggesting that their role in facilitating both learning and administrative tasks is increasingly acknowledged. This showcases the practical functionalities of AI generative tools in improving educational practices and administrative efficiency. The integration of AI in education raises important ethical considerations, balancing data-driven decision-making with the need to uphold human ethical values, as noted by [36]. Furthermore, a study revealed differing views on its use in education, emphasizing the importance of addressing these perceptions to enhance student engagement effectively [37]. In addition, ChatGPT's role in increasing engagement underscores the need for comprehensive teacher training to navigate these tools proficiently [6]. This provides the complexity of AI integration, where ethical concerns and the need for engagement must be addressed to fully realize AI's benefits in education. The findings suggest a pathway by fostering an environment where AI tools are used responsibly, with an emphasis on transparency, accountability, and a human-centric approach to education.

(d) Challenges of AI Integration

The integration of artificial intelligence (AI) into administrative practices in education presents both unparalleled opportunities and complex challenges [38]. The challenges of AI implementation in education include difficulty in assessing its effectiveness, technical challenges in developing AI applications, and the need for dynamic collaboration from research, clinical, and educational perspectives [39][40]. Furthermore, the potential obstacles in contemporary algorithms, such as the lack of data curation, sharing, and readability, the inability to illustrate the inner decision-making process, and the neglect of ethical principles in the design of AI frameworks, hinder the routine implementation of AI [41]. Additionally, there are apprehensions regarding the inadequate transparency and comprehensibility of AI-driven systems, inferring challenges for educators and education policymakers to understand the decision-making processes of such systems [42].

Moreover, it showed the complexities of ensuring AI applications in education adhere to regulatory and ethical frameworks, emphasizing the necessity for educational institutions to navigate these challenges carefully [43]. Addressing these ethical dilemmas is crucial for maintaining trust and fairness in AI-enhanced educational environments. This emphasizes the importance of developing strategies to mitigate data privacy concerns and algorithmic biases, ensuring AI

integration supports equitable and secure learning experiences.

The practical challenges of AI integration, such as technological limitations and budget constraints, are critical barriers that educational institutions face. The need for adequate infrastructure and teacher training in AI tools is fundamental to overcoming these hurdles. Furthermore, the importance of resource allocation for successful AI implementation, along with the difficulties schools encounter in balancing financial constraints with the desire to adopt innovative technologies [44]. This reveals the necessity for strategic planning and investment in infrastructure and professional development to facilitate effective AI integration. Addressing these challenges is essential for integrating AI into educational leadership, ensuring that schools have the necessary resources and knowledge to leverage AI technologies effectively.

The need for clear leadership and the presence of staff resistance further exacerbates the difficulty of adopting AI in educational contexts [45]. The lack of guidance and apprehension about AI's role can hinder its acceptance and integration. Overcoming AI integration hurdles by establishing robust IT infrastructure and clear policies, which indicates the importance of demonstrating AI's benefits to alleviate staff resistance [46]. This emphasizes the critical role of leadership in guiding AI integration efforts and fostering an environment that encourages acceptance and understanding of AI technologies. In educational administration and supervision, educational leaders must address resistance through clear communication, supportive policies, and continuous professional development, ensuring a smooth transition to AI-enhanced educational practices.

CONCLUSION AND RECOMMENDATION

After a thorough review, incorporating generative tools based on artificial intelligence into educational settings is making a significant impact.

(a) Impact of AI integration. AI generative tools have fundamentally transformed educational administration and supervision by enhancing operational efficiency, facilitating data-driven decision-making, and enabling personalized learning experiences. These technologies have redefined traditional methodologies, streamlining processes such as curriculum planning, implementation, evaluation, and administrative tasks.

(b) Perceived Benefits. The review identified significant benefits of AI integration, including the automation of routine tasks, improved efficiency in

administrative operations, and the provision of sophisticated support for students and teachers. Furthermore, AI tools have demonstrated their functionality in creating dynamic and engaging learning environments, adapting to individual student needs, and offering real-time feedback.

(c) Functionality of AI Generative Tools in Education. The functionality of AI-generative tools presents both vast opportunities and notable challenges for the education sector. These technologies have the potential to significantly enhance the quality of education, personalize learning experiences, and improve the efficiency of educational administration and supervision. However, to realize these benefits, educational institutions must navigate the complexities of AI integration with a strategic approach that includes ethical considerations, investment in infrastructure and training, and the development of policies and guidelines to govern AI use. Embracing the functionalities of AI while mitigating its challenges will be crucial for educational leaders aiming to align technological advancements with the core principles and objectives of education, thereby ensuring that AI serves as an asset in the pursuit of academic excellence and innovation.

(d) Challenges of AI integration. Despite the evident benefits, integrating AI into educational practices presents several challenges. These include ethical dilemmas, such as data privacy concerns and algorithmic bias; technical and budgetary constraints that hinder the adoption of AI technologies; and resistance among educational staff due to a lack of clarity and apprehension about AI's role and impact.

To facilitate a balanced integration of AI in educational leadership and supervision, several key recommendations emerge from the study's findings, emphasizing the need for a comprehensive approach to navigating the complexities of AI adoption. Firstly, it is imperative that educational institutions establish comprehensive ethical guidelines and policies designed to address and mitigate data privacy concerns and algorithmic biases. These measures are crucial in ensuring the responsible use of AI technologies, safeguarding students' rights, and maintaining trust within AI-enhanced educational environments.

Additionally, overcoming technical and budgetary challenges necessitates significant investment in IT infrastructure and professional development. Schools are encouraged to allocate necessary resources towards the acquisition of AI technologies and to provide ongoing training for educators and administrative staff, ensuring their ability to effectively utilize these advanced tools.

The importance of fostering collaborative leadership and engagement cannot be overstated. Clear leadership, coupled with a collaborative approach, is essential in addressing and overcoming resistance to AI integration. Educational leaders should endeavour to actively involve staff in the decision-making process, clearly demonstrate the tangible benefits of AI technologies, and work towards cultivating an environment that promotes acceptance and proficiency in utilizing AI tools.

Implementing a framework for continuous evaluation and adaptation represents another crucial recommendation. Such a framework would enable the ongoing assessment of AI tools' effectiveness within educational settings, helping to gauge their impact on educational outcomes, identifying areas for improvement, and adapting AI strategies to align with the evolving needs and expectations of students and educators.

Promoting AI literacy and ethical awareness among students and educators with a focus on understanding AI technologies, their potential applications, and their implication, educational institutions can better prepare future generations for a world increasingly influenced by AI technologies. This approach not only emphasizes the need for technical proficiency but also stresses the importance of ethical considerations in AI usage. Together, these recommendations aim to guide educational institutions in harnessing the benefits of AI while addressing its challenges, ensuring that AI integration complements and enhances educational leadership and supervision in alignment with the core principles and goals of education.

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