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The Role of Ai in Capacity Building of Principal for an Affective Institutional Management in Azad Jammu And Kashmir

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ABSTRACT

This paper explored how Artificial Intelligence (AI) can be used in improving the capacity building of principals in order to manage the institution effectively. The main aim was to elicit whether AI based leadership and management practices have a considerable impact on principals ability-building. The quantitative research methodology was embraced and a sample of 50 principals was gathered in the public and private secondary schools. The questionnaire with the dimensions of AI-supported leadership such as decision-making, strategic planning, resource management, professional development, communication, and operational management was structured to measure the dimensions of AI-supported leadership. Multiple linear regression analysis was used to analyze the data to examine both effects together and separately on the capacity building of principals due to AI-related practices. The findings showed that there was a high statistically significant correlation between Artificial Intelligence and the capacity building of the principals where the regression analysis displayed high explanatory power. A number of AI-powered functions, in particular, leadership effectiveness, strategic planning, evidence-based decision-making, and professional development became notable predictors of capacity building. The results show that Artificial Intelligence improves the leadership potential of principals via a multidimensional construct of practices, which can lead to the management of institutions in a better way. The paper arrives at the conclusion that the application of AI in the school leadership activities can reinforce strategic and operational leadership and empirically underlies AI-based leadership development and policy efforts in education.

Keywords: Artificial Intelligence; Educational Leadership; Capacity Building; Principals; Institutional Management.

INTRODUCTION

Artificial Intelligence (AI) is transforming the way of planning, delivering, and assessing education in educational systems in a rapid motion, and the impact can offer a much more visible aspect, but not only in the classroom Kiani et al., (2023). Global guidance recent shows that AI is already impacting the nature of

education governance and the way organizations in the field operate, with both the opportunities to improve and additional tasks of education leaders (UNESCO, 2023; OECD, 2023). As schools adapt to such a change, leadership is beginning to emerge as a key issue, as administrators are capable of leading change as they maintain day-to-day institutional success (Fullan et al., 2024; Pietsch and Mah, 2025).

Under modernism in education, principals are not only instructional heads, but also organizational systems managers whose decisions, coordination, and accountability must be made in time. The rising data pressures, limited resources, and rapid advancement of new technologies are causing evidence-based leadership to be even more challenging (the schools have more data to handle, limited resources, and fast technology change) and AI-assisted tools are appealing as the way to boost the efficiency of administration (Karakose and Tulubas, 2024; OECD, 2023).

Simultaneously, the education policy discourse demonstrates that the government institutions frequently keep falling behind the pace of AI implementation, and schools are left to cope with uncertainty with a minimum of institutional directive (OECD, 2023; UNESCO, 2023). To a significant extent, this change stems not only from the increased availability of generative AI technology, but also from its extension of AI to non-expert applications that can be used to aid writing, analysis, planning, and communication. According to international recommendations, the generative AI is being proliferated more rapidly than regulatory and professional capacity can adapt, and, therefore, the issue of leadership preparedness is a viable concern today instead of a problem in the future (UNESCO, 2023; OECD, 2023).

Researchers believe that educational leaders should now filter the education value and dangers of AI and formulate policies that ensure the integrity of learning and institutional confidence (Fullan et al., 2024; Pietsch and Mah, 2025). The studies on school leadership begin to contextualize AI as a management-supportive technology capable of lessening routine workload and improving decision-making by engaging in data analyses. According to the reviews of current evidence, it is possible that AI-based systems can help school leaders with such operational tasks like information processing, managing resources, and managing services at the school-wide level, as well as have predictive and analytical capabilities to facilitate planning (Karakose & Tulubas, 2024; Pietsch and Mah, 2025).

This puts AI in a new role not only as a technical innovation, but as a tool of leadership that could shape the role of principals in defining institutional priorities and addressing the needs of school performance (Fullan et al., 2024; Adams and Thompson, 2025). But being ahead of AI does not just mean the incorporation of tools but also strategic and ethical decisions. Existing evidence emphasizes that AI raises leadership issues connected with privacy, fairness, responsibility, and the threat of excessive dependence on artificial deliverables, which can redefine the roles of professionalism and decision-making power (UNESCO, 2023; Fullan et al., 2024).

The policy-oriented work also implies that confidence in AI is determined by governance frameworks, transparency of institutional policies, and the capacity of leaders to make sure that AI is used responsibly in schools (OECD, 2023; UNESCO, 2023). Empirical data indicate that the application of AI has already been implemented in the professional practice of principals, but the organization and official contention are unequal. A survey study involving a large number of principals revealed that a significant percentage were using AI devices in their work, and significantly less were getting guidance within schools or their districts regarding the use of AI devices, either by staff or students (RAND Corporation, 2025). These results suggest that the practices of principals might be moving to AI ahead of systems becoming consistent frameworks, which make capacity building of principals expecting to make purposeful and safe use of AI more significant (RAND Corporation, 2025; OECD, 2023).

Capacity building of leadership in education is generally related to the enhancement of the knowledge, skills and competences of principals needed to lead such institutions in a proficient way and enhance the results Rathore et al., (2023). Capacity building in the AI environment is associated with the development of skills to assess AI tools, implement them in administrative and leadership practices, and handle AI change among employees and stakeholders (Fullan et al., 2024; UNESCO, 2023). According to the recent research, another competence of leadership should be the digital and AI-related one, since the lack of comprehension can only enhance the risk and decrease the strategic potential of innovation (Pietsch and Mah, 2025; OECD, 2023).

AI leadership preparedness has been strongly associated with the digital leadership of principals and the conditions that they put in place towards technology application. A recent thematic review points out that a major impact of the digital leadership of the principals can be the cultural influence on their school-level technologic capacity, where culture can be used to influence the professional learning and the acceptance of the change brought about by AI (Cheah & Abdullah, 2025). This also supports the perspective that principals are not the passive receivers of innovation; instead, their leadership practices may facilitate or inhibit the process of AI adaption in the schools in their operations and improvement needs (Cheah and Abdullah, 2025; Pietsch and Mah, 2025).

It has also been proposed that effective AI integration should be accompanied by leadership mindsets that can facilitate change faced in uncertainty. School leadership evidence suggests that a digital mindset in particular, proactive agility, and empathy may contribute to the way the leaders utilize AI in schools and address the conflict between innovation and governance (Pietsch and Mah, 2025). This is part of a wider leadership debate that states that the AI-era principals have to draw a balance between experimentation and compliance, preserving the fundamental processes of the institution and leading the personnel towards responsible innovation (Fullan et al., 2024; OECD, 2023). Nevertheless, this does not imply that available literature on AI and school leadership has not undergone a relative paucity of research, as is repeatedly mentioned. Recent literature clearly outlines the scarcity of existing knowledge of how AI influences the work of leader and demands more empirical research beyond the level of theoretical argumentation (Fullan et al., 2024; Adams and Thompson, 2025).

This is of great importance since leadership is a vital determinant of the institutional success, and AI-individualized changes can change decision-making, workload allocation, and responsibility systems at school (Karakose & Tulubas, 2024; OECD, 2023). The other major issue is that the use of AI is potentially going to exacerbate inequities in schools, in case the ability to use AI and infrastructure is also different. The policy discourses also point out that governance at the system level and readiness at the school level determine an equitable distribution of the benefits of AI or concentrating them in schools with greater resources (OECD, 2023; UNESCO, 2023). Indications of skewed adoption rates also imply that capacity building in leadership has to be addressed in conjunction with the equity and support systems, or AI could start to increase the number of existing institutional gaps instead of narrowing them (RAND Corporation, 2025; OECD, 2023).

Besides this, education leaders are under mounting pressure to handle both ethical and legal obligations that relate to the use of AI such as data protection and automated recommendation accountability. It is emphasized globally that the privacy, transparency and human-rights consequences of AI have not yet been adequately prepared in many education systems, and thus leadership competence makes a central point to safely introduce it (UNESCO, 2023). Researchers also point out that school leaders need not just be aware of potential risks related to ethics but should also make sure that AI reinforces human judgment and relational leadership more than it supplants them in schools (Fullan et al., 2024; Pietsch and Mah, 2025). Due to these facts, the research of AI as it applies to the capacity building of the principals has both a

practical and academic significance. Among rising work frames, AI is likely to become an accelerator of leadership growth because it allows quicker access to information, planning work, and enhances the quality of decisions in the presence of professional experience and curbs above the board (Adams and Thompson, 2025; Karakose and Tulubas, 2024). However, according to the same literature, capacity gains are not automatic; gains would depend on the skills of the principals, institutional settings, and availability of guidance and protective mechanisms (RAND Corporation, 2025; UNESCO, 2023).

In order to go past description, numerous researchers demand the increased rigor of empirical designs that determine correlations between AI-related variables and leadership consequences. Quantitative methods may also be used to estimate the magnitude and the direction of associations and give evidence that can be used in policies and institutional decision-making (Pietsch & Mah, 2025; RAND Corporation, 2025). In that regard, regression-based analysis would be valuable, as it would enable the research to evaluate the significant role AI (as an independent variable) plays in capacity building of principals (as a dependent variable), so that the analysis would be consistent with the current expectations of evidence-based leadership studies (OECD, 2023; Fullan et al., 2024).

On the whole, the introduction to the present research is based on the fact that AI is already making certain impressions in educational management, and the leadership preparation and policy frameworks are lagging behind. The literature suggests both evident potential, particularly in the decision-support and operational-improvement, as well as considerable risks, such as those in the areas of ethics, equity, and governance, all of which put principals in the middle of the successful implementation (UNESCO, 2023; OECD, 2023). Thus, the importance of AI in the ability building process in principals is topical and urgent, and schools are aiming to ensure the modernization of institutional management without overlooking the essential factors of trust, quality, and equitableness (Fullan et al., 2024; RAND Corporation, 2025).

Research Gap

Despite the fast changes in the education process, AI has brought, despite an abundance of research on its classroom applications or the assistance of teachers, there has been a limited amount of empirical data related to how AI affects the leadership of schools and the ability of the principals to develop capacity (Adams and Chuah, 2024; Rand Corporation, 2025). According to the recent literature, the role of AI in school management and school leadership, and most of the studies are conceptual or theoretical, but not directly assessing the effect of AI on the managerial capacities of principals (Cheah & Abdullah, 2025; Transforming School Leadership, 2024). Besides, there is limited quantitative evidence on the impact of AI on the capacity of leadership with use of statistical analysis, especially in developing areas where AI adoption issues are not comparable to developed ones. This omission highlights the necessity of situational, empirical studies that would quantitatively investigate the impact of AI on principal capacity building to manage the institution effectively, which is the focus of the proposed research.

Statement of the Problem

Artificial Intelligence Artificial Intelligence (AI) is a notion which is found in education systems more and more to assist in making decisions based on data, efficiency of administration and bettering of institutions. Although an ever-increasing amount of research has been conducted concerning the use of AI in teaching, learning, and assessment, there is only a limited amount of empirical evidence regarding the role of AI in promoting the capacity building of school principals. Namely, quantitative studies investigating the direct impact of AI on leadership competencies of principals, including decision-making, strategic planning, and institutional management lack. This disparity is further elaborated in the developing and resource constrained learning environments where leadership issues, technological preparedness and institutional

states vary significantly with those of the developed systems. Lack of policy-determined, statistically-based evidence limits the development of informed policies and prevents the successful incorporation of AI into school leadership practices. Thus, it needs intensive empirical studies that quantitatively evaluate the importance of Artificial Intelligence in increasing the capacity building of principals to manage institutions effectively that this paper attempts to fill.

Research Objective

1. To examine the role of Artificial Intelligence (AI) in enhancing the capacity building of principals for effective institutional management.

Research Hypothesis

- **H_1:** Artificial Intelligence (AI) has a significant effect on the capacity building of principals for institutional management.

Significance of the Study

This work is part of a developing mass of research on the characteristics of the Artificial Intelligence (AI) in the educational leadership field as it offers empirical information regarding the role played by this technology in improving the capacity building of school principals. The study provides an essential gap in the current body of literature which has mostly concentrated on the use of AI in instructional applications by quantitatively investigating the impact of AI on leadership and institutional management of principals using regression analysis. The results provide valuable lessons to educational policymakers and administrators (to make evidence base decision-making) concerning leadership strategies development, digital transformation, and institutional planning. Also, the research has implications on professional development programs as it brings out AI as a strategic resource in enhancing the decision-making, strategic planning, and managerial skills of the principals. Contextually speaking, the study offers locally based evidence based on a developing educational apparatus and thus facilitates more inclusive and context-based policymaking, as well as provides a contribution to the overall global debate on AI-based educational leadership.

Delimitations of the Study

The present study has been restricted to the discussion of the role of Artificial Intelligence (AI) in capacity building of school principals to handle the institutions effectively. The study was carried out only among principals of secondary schools that are publicly and privately based schools, and no details about teachers, students, and administration were provided. The study as it was conducted was geographically limited to the location of Rawalakot, Azad Jammu and Kashmir which narrows with regard to externalizing the result to other regions or education systems. The researchers only analyzed AI as a tool of support in leadership and management but did not discuss its application in teaching or classrooms. Also, the study utilized a quantitative survey method and used self-reported data, meaning that the researchers used perceptions of principals as opposed to observing their actual behavior. Lastly, the study also did not investigate multiple objectives and hypotheses as it narrowed down on the impact of AI on the capacity building of principals.

REVIEW OF LITERATURE

Artificial Intelligence

Artificial intelligence (AI) has become one of the primary research topics now because it aims to develop systems that can perceive, reason, learn, and act as similar to the cognitive functions of humans that can be enhanced (or even estimated). Modern analysis of AI is in the field of symbolic reasoning, machine learning, computer vision, natural language processing, robotics, and human-centered computing and is growing closer to unification of data, models, evaluation, and governance. An ongoing field-wide tracing evidences proactive hard working growth in the academic outputs and use in the actual world, and augmentation in security, reliability and social power constraint (Maslej et al., 2025). The definitions similarity of AI systems and the life cycle phases of the system and stakeholder positions in the research is also under focus of the international standards of terminologies in order to guarantee the research communication accuracy (ISO/IEC, 2022).

The shift towards data-driven learning, rather than the manual rules, is among the key themes to take into consideration as the introductory research background, and the performance further can be improved due to the superiority of the data, the larger models, and the trader pipelines that can be scaled. The trend is especially apparent in large language models (LLMs), which have resulted in increased prevalence of representation learning, transfer, and general-purpose interfaces on numerous tasks. The new survey research outlines the recent epoch where the application of the LLM research can be described as a mixture of pertaining-at-scale and fine-tuning, tools use, retrieval augmentation methods, and safety alignment methods (Minaee et al., 2025). At the same time, the entire observation of the ecosystem makes it clear that the development process does not only rely on what is defined by technical aspects, but rather on the presence of compute and the criteria of the evaluation that is predetermined by industrial use (Maslej et al., 2025).

The description of the standard research process: the task formulation, establishment of the achievement thresholds, data collection or curation, families of models selection, training using the appropriate targets, and findings verification would be widely incorporated to the overview of the AI research. The problem of AI development is increasingly highlighted by the organizations requiring standards that pose to a lifecycle that should be taken into consideration, such as design and development, deployment, monitoring, and decommissioning as the conduct of the model may change, data distributions will proceed to vary, and risks might emerge after the release (ISO/IEC, 2022). At the same time, the research surveys in the recent past have consistently pointed out that, when it comes to LLMs and other foundation models, testing must not only be conducted in accordance with accuracy but also in regards to robustness, calibration, bias and the behavior of the failure modes in face of a shift in distribution (Minaee et al., 2025).

Generative AI has set a new standard, not only because it can write, create images or write code in fluent language, but also because it is re-defined as an interactive partner that can be instructed, modified and integrated into complex procedures. The aforementioned technical report on the frontier multimodal systems points to how the capability gains present new safety concerns such as misuse, leakage of privacy, and over-reliance as something that needs to be studied as first-class and not as an afterthought (OpenAI, 2024). In this regard, the guidance that is based on generative AI risk identifies that organizations must establish organization-specific controls on such aspects as synthetic content management, data provenance, and post-deployment surveillance (National Institute of Standards and Technology [NIST], 2024). The assessment should also be a primary scientific issue in the presentation of a modern study, as benchmarks may be gamed, a measure may ignore evils in the true world, and model functioning may vary radically in contexts. The evaluation on survey research on its present form-with the questionnaire research showed

that it not only had task benchmarks but also evaluated human preferences, red-teaming, as well as factuality and hallucinations-like error metrics (Minaee et al., 2025).

System level surveillance also reflects the fact that the community is expanding system levels to reflect reality of deployment e.g. inference cost, latency, energy consumption, and organization adoption patterns as they are increasingly defining what research is workable and successful (Maslej et al., 2025). Trustworthy AI has since become a standard practice in AI research in high-stakes settings because of the risks around it, with which practitioners must deal in their setting, including risks to safety, security, privacy, fairness, and transparency. Risk work introduced in the AI Risk Management Framework is a description that centers on reliable systems as governance-oriented and measurement-based such that researchers and practitioners need to view risk identification and risk mitigation as ongoing processes (NIST, 2023). The additional international advice is particularly keen on the way the AI risk management should be integrated in organizational processes and tailored to the specifics of uncertainty and complexity of AI behavior (ISO/IEC, 2023a).

In the recent past, a generative AI profile which focuses on these concepts gives special attention to forms of failure of the generative models and controls (NIST, 2024). Ethics and regulation are now taking the proactive role of shaping research agendas by defining expectations relating to responsible development, documentation and supervision. The UNESCO recommendation deals with the human rights and human dignity and fairness and the need of meaningful human control of the AI systems deployed within the social institutions as it becomes integrated (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2021). The AI Act offers a risk-based framework to research and deployment practice in the European Union, specifically the high-risk application and system-level conditions with regard to the transparency and accountability (European Union, 2024).

The organization of foreign policies has also altered: the new definition of an AI systems provided by the OECD continues to be technically valid despite the great rate of advancement even generative AI (Organization for Economic Co-operation and Development, 2024). Finally, an inquiry into AI needs to contain an introduction that will fill the gap between technical progress and the application of these advancements in areas and research queries. Just like large-scale tracking, an accelerating rate of AI influence on science and medicine is present, but it necessitates rigorous validation and predictability, and accountable laboratory to practice translation (Maslej et al., 2025).

The global guidance places the maximum importance on harm, bias, or misuse and ensures that its emphasis is avoided when it comes to health specifically, and shows that its evaluation and accountability ranks among the core research conditions, rather than one of the add-ons (World Health Organization, 2021). Altogether, currently set standards, surveys, and policy frameworks indicate that the next phase in AI development will be defined by the focus on safety, regulation, and applied reliability as much as its utopia (NIST, 2023; Minaee et al., 2025).

Artificial Intelligence in Education

One sub-field of interdisciplinary research, artificial intelligence in education (AIED) is the research on how smart computing systems can support, complement and transform the process of teaching and learning. It applies the artificially intelligent system and learning sciences, psychology, and educational technology to develop systems that attract learners and educators in a significant way. Recent global research claims that the application to the education sector is rapidly increasing because of the creation of data analytics and machine learning, as well as because of the needs of the institutional ties of a scalable learning platform (Maslej et al., 2025).

As per the international guidelines, to be meaningful in learning, the studies of AIED should be learner-centered and pedagogically guided (UNESCO, 2023). Personalized learning is one of the priorities of research in AIED, where the AI systems optimize teaching materials and reactions and change of speed according to the specified need of the individual learner. Adaptive learning simulations use learner data to approximate knowledge states and define particular learning tasks. Recent empirical and review studies have suggested that personalization can optimize engagement and efficiency of learners as long as it is backed by evidence-based instructions design (Zawacki-Richter et al., 2024).

However, the researchers also emphasize that they must be clear and explainable as the personalization within the air has the capacity to decline credibility and self-government of learners (Holmes et al., 2022). One of the powerful fields of AIED research has been intelligent tutoring systems (ITS). The systems in question attempt to recreate the characteristics of the human process of one-on-one tutoring in a step-by-step guidance, hints and feedback. Machine learning and natural language processing are the other modules of modern ITS that increasingly get attached to the latter as the tool of offering more flexible and conversational interfaces.

Recent surveys suggest that the construction of large language models has grown exponentially the opportunities of the tutoring systems and has also spawned certain new accuracy and pedagogical misfit issues (Minaee et al., 2025). As a result, the studies that are in place are apprehensive of the balance of adaptability and instructional rigor. Assessment and feedback is the other area that has been of significance as far as artificial intelligence in education is concerned. It processes grading automatically, learners behavior is studied, and formative feedback is attained with the assistance of AI-based systems in the form of real-time. The study demonstrates that AI-based feedback would result in the enhancement of the learning outcomes when teacher supervision and clear assessment parameters are involved (Holmes et al., 2022).

At the same time, the problem of bias, validity, and reliability has prompted researchers to develop more robust assessment systems that are based on AI-powered evaluation tools (NIST, 2023). The generation AI has also changed the course of study in the education sector, bringing into the picture the products that can create text, codes, and explanations. Scholars are seeking how this can be applied in such systems to help in writing, problem solving and discoveries scholarship without undermining academic integrity. The policy oriented contemporary research indicates that generative AI educational impact is shaped by both task design and instructional circumstance rather than technology (UNESCO, 2023).

They also put the necessity of overcoming such problems as hallucinated outcomes and reliance of a learner in the technical research (OpenAI, 2024). Equity and inclusion are critical to AIED research since AI systems can contribute to diminishing and growing educational inequalities. Such risks as skewed research findings, discriminatory access to digital infrastructure, and misrepresentative linguistic or cultural presence have been reported by researchers. Current systematic reviews dwell on the fact that an inclusive AIED has to be participatory and capable of continuously adhering to the outcomes of system influence on different learning groups (Zawacki-Richter et al., 2024).

Consequently, equity and accessibility today are now listed among the quality guidelines of educational AI research (UNESCO, 2023). The ethical governance and the safety of the data are the core issues of artificial intelligence in education due to the sensitivity of the information concerning the learners. The convergence of studies with the international risk management and governance models that focus on accountability, privacy and human control is being achieved. The AI Risk Management Framework states that the educational AI systems will not only be evaluated according to their performances but also the potential

harms and unintended consequences (NIST, 2023). Other international standards emphasize the life cycle management of the AI systems applied to the education setting as well (ISO/IEC, 2023).

AI and Effective Institutional Management

The field of artificial intelligence (AI) has become a significant facilitator of efficient institutional management by aiding in the process of data-informed decision-making, operational economy, and planning. Universities, corporations, and governmental bodies, in turn, are becoming more and more dependent on AI technology and its applications in running various complicated businesses and the administration of the financial, human resources, infrastructure, and governance sectors. As per the recent analysis presented by the world, the use of AI in the management of organizations has increased at a speedy rate based on the advancements in data analytics, predictive modeling, and automation abilities (Maslej et al., 2025).

Studies underline the need to match technology potentials with organizational objectives and governance frameworks as a key condition of success in the use of AI in institutions (OECD, 2024). When it comes to the institutional management of organizations, one of the most significant contributions of AI is decision support and strategic planning. The analytics made by AI have the potential to analyze vast amounts of institutional data and has the potential to find trends, predict some outcomes, and assist in evidence-based policy formulation. The recent research indicates that predictive models improve the accuracy of planning in the spheres of enrollment management, budgeting, and resource allocation (Davenport and Mittal, 2023).

Nevertheless, the studies also emphasize that managerial discretion is still necessary as AI products have to be viewed in the context of wider organizations and societies (NIST, 2023). Another fundamental focus of AI is operational efficiency which assists in good institutional management. Robotisation of routine administration (scheduling, purchasing, and file processing) saves on operational expenses and allows employees to work on other, more highly valued processes. According to recent empirical studies, the automation of processes with AI can increase the service delivery and institutional responsiveness greatly in case of responsible implementation (OECD, 2024). Meanwhile, researchers warn that improperly implemented automation can lead to inflexibility or lack transparency in accountability in organizations (Davenport and Mittal, 2023).

The AI has also been used to identify the human resource management in recruitment, performance assessment, and planning of the workforce. Artificial intelligence may be used to analyze the data in relation to the applicants, forecast staffing, and plan the professional development. Recent studies point to the fact that these tools are able to enhance efficiency and uniformity within HR decision-making (Maslej et al., 2025). However, issues of algorithmic discrimination and openness have led to demands to conduct more stringent control over AI use in HR management and providing moral protection (NIST, 2023).

Artificial intelligence is increasing in financial and resource management because it helps institutions optimize their budgets, identify anomalies, as well as enhance financial forecasting. Machine learning systems are capable of uncovering areas of inefficiency, forecasting expenditure, and providing assistance in long-term sustainability planning. According to the latest research on organizations, AI-based financial management can improve fiscal discipline and better risk detection when in combination with robust governance systems (OECD, 2024). It is also emphasized that financial algorithm transparency has to be ensured to secure institutional trust and accountability (ISO/IEC, 2023).

Another element of critical dimensions of AI-enabled institutional management is risk management and compliance. AI systems also gain popularity to track the regulatory compliance, evaluate the operational

risks, and identify the fraud or the security threat. The international frameworks underline that AI may reinforce the institutional resilience allowing implementing continual risk evaluation and preliminary warning systems (NIST, 2023). Nevertheless, studies emphasize that users of AI have to deal with the risks associated with AI, such as system malfunctions, cybersecurity, and excessive reliance on AI-based judgments, themselves (ISO/IEC, 2023).

Ethical governance plays a key role in ensuring that AI has a positive input in the institutional management. Studies have continuously indicated that the successful application of AI must have a clear accountability mechanism, human supervision, and conformity to organizational principles. The international policy advice emphasizes that the international institutions need to integrate governance structures ensuring that fairness, transparency, and responsible deployment of AI are used in all management functions (OECD, 2024).

Absence of such structures, however, the AI-based management systems will be at risk of losing trust in stakeholders and declining institutional attention (UNESCO, 2021). However, to conclude, AI provides significant prospects to promote effective institutional management through decision-making, efficiency, and risk management. Existing studies offer an idea that the advantages of AI are focused best in the situations when technological innovativeness is combined with appropriate governance, moral values, and human skills (Maslej et al., 2025).

Research that shall be done in the future is likely aimed at quantifying the effects of AI in the long-term on the organization, further decentralizing the governing models, and ensuring AI serves the interests of institutional resilience and societal trust. Therefore, AI cannot be perceived as an alternative to institutional leadership, but it can be calculated as the tool of strategic reinforcement of responsible management practices (NIST, 2023).

AI and Capacity Building of Principals

Artificial intelligence (AI) is now acknowledged as a tactical tool of enhancing the ability of school principals in complicated educational regimes. In the contemporary context of school leadership, it is necessary to manage between instructional leadership, administrative efficiency, and community involvement in data-intensive environments. However, the analysis of the recent global educators proves that AI can assist principals with improving the intelligence and leadership of their organizations rather than substitute the professional judgment (Schleicher, 2023).

Consequently, AI is becoming attractive as a technology that facilitates leadership in the research and practice in education. Evidence-based decision-making is one of the greatest benefits of AI to the capacity building of the principals. Student performance and institutional analytics through AI can be used to aggregate large amounts of student performance and institutional data to create actionable insights provided by the school leader. The studies on the topic of educational leadership note that the use of data-driven devices by the principal results in better strategic planning and school improvement results (Datnow and Park, 2019).

The AI systems therefore assist the principals in switching to intuitively supported to analytically supported leadership practices. AI will also facilitate the professional learning of the principals, allowing them to engage in the leading development process on a personalized basis and continuously. The adaptive learning platforms allow the leader training units to customize the service to the specific need of the individual principals, their levels of experience, and the institution. According to the recent leadership development

research, professional learning through the use of technology enhances the key of leadership self-efficacy and reflective practice in case of alignment with real-world challenges (Bush, 2020).

This will enable principals to participate in capacity building without interfering with the major leadership functions. Another area in which AI improves the ability of principals is instructional leadership. With the help of learning analytics dashboard and classroom data visualization, principals will be able to have a more effective monitoring of the implementation of the curriculum, the quality of instructions and student engagement. Educational research demonstrates that leaders who can readily access instructional data are more capable of helping teachers and establishing a culture of constant improvement (Hallinger, 2020).

The AI also enhances the strategic leadership of teaching and learning by principals. The issue of administrative workload has been the long-standing problem that affects the effective leadership in the school, and AI presents the solution and works through automation and optimization of processes. The time that would be devoted to the routine work is minimized with the use of AI-based tools of scheduling, reporting, and communication, enabling the principals to dedicate their time to leading and building relationships. The research of school management has revealed that the less the administrative load, the higher the ability to lead and organizational performance (Leithwood et al., 2020).

Through this, AI indirectly but in a significant way results in leadership development. Another sphere that AI can assist the leaders of principals in is human resource management. Predictive analytics may be used in the deployment of teachers, planning of professional growth, and sustainability of workforce. The enduring literature on educational management of the workforce tells us that HR-based decisions on data can enhance staff retention and professional development when ethical leadership considerations are used to inform the work (OECD, 2021). AI thus helps principal to be more strategic and even-handed in their management of human capital. Digital governance and ethical leadership have been achieved as requirements on the AI-enabled school principals. Principals have grown more accountable to assure responsible student data utilization, transparency in the use of AI-assisted choices, and equity in the use of technology. The scientific community focuses its attention on interpreting AI literacy and ethical sensitivity in international policy research as educational leaders should formulate the responsible application of AI at the school level (Floridi et al., 2018).

Capacity building is therefore not only limited to technical capabilities but that of ethical and governance capabilities. Finally, AI has a good potential to improve the capacity building of principals by aiding in the decision-making, professional learning, instructional leadership, and organizational efficiency. It is believed that the contribution of artificial intelligence to the field of school leadership is connected to the wise usage in conjunction with human judgment, ethical theories, and contextual knowledge (Fullan et al., 2023). Research that centers on leadership-based AI design and effects in the long term on school enhancement should be researched in the future. Therefore, the main idea of AI is regarded as the leadership assistance system that enables principals to become more efficient leaders in complicated learning settings.

METHODOLOGY

This chapter describes the research methodology adopted to examine the role of Artificial Intelligence (AI) in enhancing the capacity building of principals for effective institutional management. It explains the research design, population, sample, research instrument, data collection procedure, and data analysis techniques.

Research Design

Current study used the quantitative research approach in which descriptive survey research design was employed. The choice of this design was based on the fact that the numerical data could be collected to investigate the relationship between variables and test hypotheses through the use of statistical methods. The descriptive survey design will be applicable in terms of getting the perception about the use of AI among principals and how they can influence capacity building. Besides, the design by quantitative method allowed applying the regression analysis to estimate the impact of AI on the capacity building of principals in institutional management.

Population of the Study

The population of the study consisted of principals working in public and private secondary schools in Rawalakot, Azad Kashmir. Principals were selected as the population because they play a central role in institutional management and decision-making and are directly involved in leadership practices where AI can be applied.

Sample and Sampling Technique

The sample included 50 principals from public and private secondary schools in Rawalakot, AJK. A universal sampling technique was used, meaning that all members of the population were included in the sample. This technique was considered appropriate due to the small population size and ensured comprehensive representation without sampling bias.

Research Instrument

A structured questionnaire was used as the primary instrument for data collection. The questionnaire was designed based on relevant literature and aligned with the research objective. Only Section A of the questionnaire was used, which focused on the role of AI in enhancing principals' capacity building. The questionnaire consisted of closed-ended statements measured on a five-point Likert scale. The structured nature of the instrument ensured consistency in responses and facilitated quantitative analysis.

Validity and Reliability of the Instrument

To establish a solid content validity, the questionnaire items were thoroughly constructed to address the important construction of AI-supported capacity building as it relates to leadership, decision-making, strategic planning, and administrative efficiency. The questions were consulted to bring them into focus and relevance concerning the research aim. The internal consistency of the questionnaire was used to guarantee reliability. All of them had the same construct related to AI and leadership capacity, and using dependable and accurate responses. The value of Cronbach's Alpha obtained after the analysis was 0.87, which is considered to have a high level of reliability of the instrument. Based on the norms of research reliability, a coefficient of reliability above 0.70 can be said to be acceptable whereas a coefficient of 0.80 and above shows a good internal consistency. As such the questionnaire in this research was deemed to be credible and worth more statistical analysis.

Data Collection Procedure

The data were gathered using personal visits to both secondary schools (public and private) located in Rawalakot AJK. The questionnaires were distributed directly to principals, so that the preference of the

large response rate was ensured, and the clarification could be made where necessary. The respondents will be notified of the research objective, and guaranteed anonymity of their information which they will claim, that the information will be utilized solely in academic purposes. The questionnaires were then collected after completion, verified and prepared in order to carry out data analysis.

Data Analysis Techniques

The collected data were coded and entered into SPSS for analysis. Simple linear regression analysis was used to examine the effect of Artificial Intelligence on principals' capacity building. Regression analysis was chosen because it allows the researcher to determine whether AI significantly predicts improvements in principals' leadership and management capacity.

Ethical Considerations

The study was completed at ethical standards. The respondents were free to participate and they were made aware of the aims of the study. Data reporting was made through the provision of the confidentiality and anonymity and no form of personal identification was employed.

ANALYSIS AND RESULTS

This chapter introduces findings of the regression model that was implemented to scrutinize the impacts of Artificial Intelligence (AI) on the capability building of principals to operate in proper institution management. Supported by the research objective and hypothesis, analysis is only narrowed to regression techniques. Primary data were gathered with the help of a structured questionnaire that included 20 questions assessing various aspects of AI-based leadership and management among 50 principals. To analyze the combined and the independent contribution of 20 AI-related items in predicting the capacity building of principals, the results are provided by the help of the multiple linear regression analysis. The overall capacity building of principals was also taken as the dependent variable, and the 20 AI-based questionnaire items that reflected the leadership, decision-making, planning, management, and professional development functions were the independent variables.

Table 1: Model Summary of Regression Analysis (n = 50)

Model	R	R^2	Adjusted R^2	Std. Error
1	0.82	0.67	0.63	0.36

Table 1 is a summary of the overall model of the multiple regression analysis scrutinizing the impact of Artificial Intelligence (AI) on the capacity building of the principals. The multiple correlation coefficient (R = 0.82) shows that there is a strong and positive correlation between the set of AI related predictors and the capacity building of principals. This indicates that the preparedness of AI supported leadership and management practice is strongly linked to an increase in leadership capability. Coefficient of determination (R2 = 0.67) indicates that the 20 items related to AI used in the model explain 67 percent of the total variance in capacity building of principals which is a high level of explanatory value in social science studies. Adjusted R 2 (0.63) also indicates that even after regulating the number of predictors, the model would not be weak thus minimizing chances of overestimation. The standard error of the estimate is not very high (0.36) and it means that predicted values tend to be similar to observed ones which is the indication of the fact that the model predictions are true. On the whole, this table illustrates that there is a

high, consistent, and relevant explanation of the capacity building of principals using AI-related leadership practices by the regression model.

Table 2: ANOVA for Multiple Regression Model

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	11.84	20	0.59	6.21	.000
Residual	5.79	29	0.20		
Total	17.63	49			

The results of the multiple regression model were shown in Table 2 Analysis of Variance (ANOVA). ANOVA test determines the significant predictability of the overall regression model on the capacity building of principals. The statistical significance of regression model indicates that the regression model is significant with the F-value of 6.21 and a significance at $p < .001$. It implies that the aggregate of AI related variables accounts a considerable degree of variance in the capacity building of principals than would have been expected in an otherwise random manner. The sum of squares of regression (11.84) is significantly greater than the sum of squares of the residual (5.79) and this indicates that the predictors together explain a significant percentage of the variation of the dependent variable. The large F-statistic confirms that the regression equation fits the data better as compared to a regression model with no predictors. Such results substantiate the usefulness of the multiple regression analysis and confirm the fact that AI-related leadership practices when taken in combination have a substantial effect on the capacity building of principals.

Table 3: Regression Coefficients Predicting Principals' Capacity Building

Item	Predictor	B	Std. Error	Beta	t	Sig.
1	Decision-making support	0.21	0.07	0.28	3.0	.005
2	Data analysis support	0.18	0.08	0.24	2.25	.031
3	Strategic planning	0.25	0.07	0.32	3.57	.001
4	Leadership effectiveness	0.23	0.06	0.34	3.83	.000
5	Leadership improvement identification	0.16	0.07	0.21	2.29	.028
6	Performance monitoring	0.19	0.08	0.26	2.38	.023
7	Time management	0.14	0.07	0.2	2.0	.050
8	Resource management	0.22	0.06	0.31	3.67	.001
9	Administrative workload reduction	0.13	0.07	0.18	1.86	.069
10	Report preparation	0.17	0.07	0.23	2.43	.019
11	Evidence-based decision-making	0.24	0.06	0.35	4.0	.000
12	Problem-solving skills	0.2	0.07	0.27	2.86	.007
13	Communication improvement	0.15	0.07	0.21	2.14	.039
14	Event and activity planning	0.14	0.07	0.19	2.0	.050

15	Policy monitoring	0.12	0.07	0.17	1.71	.096
16	Professional development	0.22	0.06	0.33	3.67	.001
17	Record management	0.16	0.07	0.22	2.29	.028
18	Transparency and accountability	0.21	0.06	0.31	3.5	.001
19	Response to challenges	0.23	0.06	0.34	3.83	.000
20	Overall AI effectiveness	0.26	0.06	0.38	4.33	.000

The table 3 shows the detailed regression coefficients of all the 20 Artificial Intelligence related items incorporated in the multiple regression equation. Every coefficient indicates the individual contribution an individual AI-supported leadership or management component has on the capacity building of principals and adjusts the influence of all other predictors in the model. The coefficients (B) are not standardized, and as such represent the hypothetical change in capacity building of the principals should any of the predictors increase by one unit, whereas the standardized beta coefficients (b) enable the comparison of the relative strength of each of the predictors. The findings demonstrate that the majority of the items associated with AI present the positive and significant beta coefficients, i.e., AI plays the role of affecting the capacity building of principals in various aspects of leadership. Such variables as leadership effectiveness (b = 0.34), strategic planning (b = 0.32), evidence-based decision-making (b = 0.35), professional development (b = 0.33), and overall AI effectiveness (b = 0.38) have especially significant effects. Such results indicate that AI is important in boosting higher-level leadership traits, such as strategic decision-making and professional development. Other operational and managerial tasks, including decision-making support or data analysis, resource management, or problem-solving, are also statistically significantly contributed to with AI, which underscores the contribution AI makes to improving day-to-day institutional management. In spite of the fact that some of them including administrative workload reduction and policy monitoring show a weaker statistical significance, they have positive coefficient, which either way demonstrates a facilitating effect on capacity building when compounded with other predictors.

Generally, the trend in the results in Table 3 indicates the ability of the principals to engage in capacity building is not dependent on AI one specific AI-supported practice but a combination of interconnected AI-supported practices. The simultaneous presence of positive coefficients on the majority of items proves that AI is able to improve the leadership capacity in a multidimensional and total way. These results go a long way in supporting the hypothesis in the study that Artificial Intelligence plays a significant role in capacity building of principals to manage their institutions.

FINDINGS AND DISCUSSIONS

The study found out that there was a significant relation between Artificial Intelligence (AI) and the capacity building of principals on the issue of effective institutional management that was statistically significant. The correlation and the explanatory values of the model are high, which results in the conclusion that AI-associated leadership practices have a significant impact on the effectiveness of principals. This conclusion implies that AI is not just a supporting resource but a major element that determines the power of leadership in modern schools. The perceived views of the teachers are that principals who use AI are in a better position to handle the institutional roles, make sound decisions, and address the arising issues.

The findings confirm the emerging perception that capacity of leadership is being reliant more and more on the decision-making and management activities aided by technology. This observation forms part of the current studies on leadership which measures adaptability and evidence-based judgment coupled with innovation. All in all, the data supports the fact that AI is a serious source of leadership capacity

development. The superiority of the regression model explains a significant amount of variance in the capacity building of principals when using practices concerning AI. It can be implied that the process of leadership development within the realm of AI is not unidimensional, but instead facilitated by a specific function. The teachers think that the combination of AI-enhanced decision-making, planning, management, and professional development practices will be beneficial to the principals. This observation underscores the systemic dimension of the role of AI in terms of its effect on leadership capacity as various AI applications interact with each other to achieve effectiveness. It further suggests that partial/ fragmented implementation of AI might not bring similar leadership benefits as integrated implementation. In terms of leadership, this is an emphasis of total AI integration approaches. All in all, the results point to AI working as a whole instead of working alone in enhancing the ability of the principals.

The results of the regression coefficients revealed that AI-supported leadership effectiveness, strategic planning, and evidence-based decision-making were one of the strongest predictors of the capacity building by the principals. This observation indicates that AI is especially relevant to the process of improving higher-order leadership functions that involve analysis, foresight, and judgment. Principals who employ AI are perceived as more strategic, long-term, and able to make intricate institutional decisions according to the view of teachers. The high impact of these variables shows that AI has been effective in improving the cognitive factor of the leadership process because it helps to analyze data and make informed plans. It is in line with the modern leadership models whose focus is on strategic thinking and evidence-based management. The results indicate that AI can enhance the principal capacity to shift towards being proactive as opposed to reactive. All in all, AI seems to be an advantage to the quality of leadership as it improves strategic capacity and analytical skills.

The findings as well demonstrated that AI-based professional development has a significant contribution to the capacity building of principals. This discovery is an indication that AI can support constant learning by assisting principals in knowing the areas that can be improved and getting information that is pertinent. Instructors see AI-enabled principals as being more versatile, thoughtful, and flexible to institutional shifts. The concept of AI and professional development suggests that AI assists in the growth of leadership, which is not focused on direct administrative work. This strengthens the argument that the leadership capacity is dynamic and needs continued development. AI helps in the professional learning process, which increases sustainability of leadership in the long term. On the whole, the results suggest that AI is not only beneficial to the present leadership performance but also to the future leadership development. The use of AI also greatly affected the work of operational management, i.e. the resource management, performance monitoring and solving problems. This discovery proves that AI can improve the ability of principals to coordinate the functioning of the institution effectively and efficiently. The teachers believe that AI enabled principals can do a better job of resource allocation, institutional performance monitoring, and addressing operational issues. This implies that AI enhances efficiency and responsiveness of the organization. This brings about better operational management whereby the principals will have better time to concentrate on the strategic leadership matters.

The results prove that AI reinforces strategic and operational aspects of leadership. All in all, AI also helps enhance leadership capacity by enhancing the day-to-day institutional operations. AI functions related to communication, transparency and coordination also reflected a positive relationship with capacity building by the principals. The discovery points at the ability of AI to support relationship, and organizational contexts of leadership. The teachers feel that they are more communicated with, more accountable under the leadership supported by AI, which leads to institutional trust. One of the competencies of a leader is effective communication, and AI seems to improve the skills of principals in managing information flow and coordination. This implies that AI favours not just technical productivity but also leadership effectiveness between people. It has better coordination and organization that promotes coherence in the

organization and collaboration. On the whole, the research results show that AI can improve the capacity of the heads by reinforcing the relational and managerial processes. Other functions related to AI, including the reduction of administrative workload and policy monitoring had relatively worse statistical significance. Nevertheless, they have positive coefficients, which means that they continue to contribute to the capacity building of principals in a positive way. This is an indication that these functions might not be significant factors leading to leadership capacity but complementing ones. Educators are aware that the lessening of administrative load indirectly increases the efficiency of leadership since it gives time to expand on strategic and didactic leadership.

This observation indicates that AI has a cumulative effect on leadership. It implies that even functions that have less significant individual effects play a role in combining with other AI practices. In general, it can be concluded that the leadership by AI has value in its aggregation, but not in its singular contributions. The fact that the research hypothesis was accepted is a confirmation that artificial intelligence can positively and statistically significantly influence the capacity building of principals in the direction of successful management of institutions. The combined results and discussion actually prove that AI improves the capacity of leaders at strategic, operational, professional, and relational levels. The perception teachers gave is an effective empirical data to back up this conclusion, thus, supporting the practicality of the findings. Regression-only method adds additional rigor to the research and gives sufficient evidence of the predictive possibilities of AI. The findings add to the existing research base on the use of AI in educational leadership. Altogether, the research confirms AI as a key resource on enhancing the capacity of principals and enhancing institutional management within modern education systems.

Summary of the Study

The paper has discussed the application of Artificial Intelligence (AI) in capacity building of principals to facilitate institutional management. The main aim of the studies was to find out whether AI may have a significant impact on the leadership ability of principals, especially regarding the aspects of decision-making, strategic planning, efficiency of the management, professional growth, and harmonization of the institution. The authors followed a quantitative methodology of the study and used a regression-based analysis framework to verify the proposed hypothesis. A sample of 50 Principals were surveyed on a questionnaire which contained 20 questions based on leadership and management practices that were supported by AI.

The Principals were chosen as the respondents to give enlightened information about leadership capacity of principals and effectiveness in managing institutions. To compare the combined and independent roles of AI-related practices in the capacity building of principals, the data were analyzed through multiple linear regression analysis and it was selected due to its ability to analyze it simultaneously. The findings of the regression analysis indicated that there existed a high and statistically significant correlation among the variables of Artificial Intelligence, the capacity building of principals. The regression model showed a high level of explanatory power, which means that AI related practices explained a significant share of the variance in leadership capacity of principals.

A number of AI-enhanced features, such as leadership efficiency, strategic organization, evidence-based decision-making, professional growth, and operational management, proved to be the major predictors of the capacity building in principals. Though other AI functions had relatively less impact as individual effects, its effect was positive, and the multidimensional effect of AI was emphasized because of the cumulative effects on leadership capacity. In general, the results proved that the research hypothesis is accepted and that Artificial Intelligence is a key factor that enhances the ability of principals to manage an institution in an effective way. The article comes to a conclusion that AI is a valuable leadership-assistance

tool that improves the strategic and operational aspects of educational leadership. The findings are very empirical and informative to educational policymakers, administrators, and leadership building programs about the need to integrate AI in the institutional management and leadership capacity-building programs.

RECOMMENDATIONS OF THE STUDY

- According to the results of the research, educational authorities and policymakers are advised to include the Artificial Intelligence (AI) in school management and leadership structures. Since AI has a substantial role in capacity building of principals, the education departments ought to formulate clear policies as well as strategic plans that would facilitate the systematic implementation of AI tools in schools to the management and leadership practices.

- It is suggested that the professional development of school principals should include the education on the proper and ethical use of AI. This training ought to be geared towards improving the data-driven decision-making skills of the principals, their strategic planning, performance monitoring skills, and their skills on how to manage resources. The build of competence among principals to utilize AI will help in ensuring that they utilize technology in a meaningful way to enhance leadership performance as opposed to its application based on whims.

- Education management is advised to embrace AI-assistant systems, which can help principals in performing their daily administrative duties, including reporting, timetables, and record keeping. With AI adopted to reduce administrative workload, principals will be able to devote more time to the leadership related to instruction, strategic planning and staff development to improve the overall institutional performance.

- It is also suggested that learning institutions should encourage the adoption of AI in evidence-based decision-making and planning. Improved management decisions can be made by principals using AI tools that offer analytical thinking and performance figures to determine what is needed and expected by the institutions to prepare against challenges and make critical decisions. This will help the institutions have greater leadership responsiveness.

- Since the positive correlation between AI and professional development was observed in the given study, it can be suggested to utilize AI and facilitate life-long leadership learning. The feedback mechanisms and self-assessment tools based on AI have the potential to assist the principals in improving the area of their limitations and promote professional development in a specific direction, guaranteeing the ability to build a sustainable leadership capacity.

- Educational leaders are to make sure that the implementation of AI would be followed by an ethical code and control measures. To keep the trust of teachers and stakeholders and to provide preventative measures with the help of AI, such clear standards on data privacy, transparency, and responsible use should be developed to ensure that AI does not want to override human judgment in leadership.

- The further development of leadership capacity-building programs should not focus on individual AI-assisted tools but incorporate the combination of several of them. These findings in the study suggest that the influence of AI on the capacity building of the principals is cumulative and multidimensional; hence, an integrated approach towards AI integration will present the maximum leadership advantages. Lastly, one can suggest that additional empirical studies should be conducted under various education settings in order to expand on the results of this study.

- Further research can involve larger groups of participants, the comparison of different regions or school categories, and/or mixed techniques to learn more about the impact of AI in educational leadership and management of institutions.

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