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Integrating Generative AI in Education: Implications for School Leadership from Policy Documents Through Bolman and Deal's Four Frame Theory

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Abstract

As generative artificial intelligence (Gen-AI) technologies continue to evolve, it becomes increasingly important for educators to effectively leverage their benefits within educational settings.The integration of artificial intelligence (Gen-AI) into educationrepresents a significant shift in teaching, learning, and administrative practices. This article examinesthe implications, particularly focusing on the roles and responsibilities of school leaders through Bolman and Deal's Four Frame Theory, including Structural, Human Resources, Political, and Symbolic frames.Adopting a qualitative research design based on document analysis, the study analyzes policy documents selected for their relevance to Gen-AI in education and influence on educational leadership.The findings revealed that Bolman and Deal's Four Frame Theory offers a comprehensive structure for integrating Gen-AI technologies in education. The Structural Frame highlights the need for leadership adaptation, socio-economic considerations, and R&D infrastructure development. The Human Resources Frame highlights the need for staff training, competency enhancement, and Gen-AI-focused educational initiatives. The Political Frame addresses the strategic negotiation and stakeholder collaboration necessary for Gen-AI integration. Finally, the Symbolic Frame underscores the importance of shaping cultural narratives, promoting ethical Gen-AI use, integrating Gen-AI into curricula, and fostering critical Gen-AI literacy. Based on the findings, a prominent conclusion is that school leaders are pivotal in ethically integrating Gen-AI in alignment with global standards and societal values. The study also addresses several limitations and offers recommendations for future research.

Keywords: Gen-AI integration, Gen-AI competency development, ethical Gen-AI promotion, embracing Gen-AI potential, leadership roles, leadership strategies, leadership development.

Eğitimde Üretken Yapay Zekâ Entegrasyonu: Politika Belgeleri ve Bolman ve Deal'ın Dört Çerçeve Teorisi Üzerinden Okul Liderliğine Yönelik Çıkarımlar

Öz

Üretken yapay zekâ (ÜYZ) teknolojilerinin hızla gelişmesi, eğitimcilerin bu teknolojilerin sunduğu fırsatlardan etkili bir şekilde yararlanmasını her zamankinden daha önemli hâle getirmiştir. Yapay zekânın eğitim alanına entegrasyonu, öğretim, öğrenme ve yönetim süreçlerinde köklü bir dönüşümü beraberinde getirmektedir. Bu makalede, özellikle okul liderlerinin rollerine ve sorumluluklarına odaklanılarak, Bolman ve Deal'ın Dört Çerçeve Teorisi (Yapısal, İnsan Kaynakları, Politik ve Sembolik Çerçeveler) aracılığıyla yapay zekâ entegrasyonunun etkileri incelenmiştir. Nitel araştırma modeli ile yapılan bu araştırma, eğitimde yapay zekâ kullanımı ve eğitim liderliği üzerindeki etkisi açısından önemli görülen politika belgelerinin doküman analizi yoluyla değerlendirilmesine dayanmaktadır. Bulgular, Bolman ve Deal'ın Dört Çerçeve Teorisi'nin, eğitimde yapay zekâ teknolojilerinin entegrasyonu için kapsamlı bir yapı sunduğunu ortaya koymuştur. Yapısal Çerçeve, liderlik anlayışının dönüşmesi, sosyo-ekonomik faktörler ve Ar-Ge altyapısının geliştirilmesi gerekliliğini vurgulamaktadır. İnsan Kaynakları Çerçevesi, personel eğitimi, yeterliklerin artırılması ve yapay zekâ odaklı eğitim girişimlerine ihtiyaç duyulduğuna işaret etmektedir. Politik Çerçeve, yapay zekâ entegrasyonunun sağlanabilmesi için stratejik müzakere süreçleri ve paydaş iş birliğinin önemine dikkat çekmektedir. Sembolik Çerçeve ise, kültürel anlatıların şekillendirilmesi, etik yapay zekâ kullanımının teşvik edilmesi, yapay zekânın müfredatlara entegre edilmesi ve eleştirel yapay zekâ okuryazarlığının geliştirilmesi gerekliliğini ön plana çıkarmaktadır. Araştırmanın öne çıkan sonuçlarından biri, okul liderlerinin, yapay zekâyı küresel standartlar ve toplumsal değerlerle uyumlu şekilde ve etik bir bakış açısıyla eğitim sistemlerine entegre etmede kilit bir rol üstlendikleridir. Çalışmada ayrıca araştırmanın sınırlılıklarına değinilmiş ve ileriye dönük çeşitli öneriler sunulmuştur.

Anahtar kelimeler: Yapay zekâ entegrasyonu, yapay zekâ yeterliklerinin geliştirilmesi, etik yapay zekâ kullanımı, yapay zekâ potansiyelinin benimsenmesi, liderlik rolleri, liderlik stratejileri, liderlik gelişimi.

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INTRODUCTION

The implementation of generative artificial intelligence (Gen-AI) in educational settings marks a critical juncture in the evolution of teaching and learning processes (Baidoo-Anu & Owusu-Ansah, 2023). Countries and international organizations globally have recognized the pivotal role of Gen-AI in shaping the future of education, leading to the publication of numerous policy documents aimed at guiding the integration of Gen-AI into educational systems (Chiu, 2023). While much attention is given to the technological aspects of this integration, the role of school leaders in orchestrating these changes is equally critical (Fullan et al., 2023; Sornberger, 2023; Tyson & Sauers, 2021). School leaders are often seen as the primary catalysts for change within educational settings (Sherman, & Crum, 2007). Their leadership and decision-making skills play a vital role in determining how effectively Gen-AI technologies are adopted and utilized (Arslan & Yiğit, 2024; Dexter & Richardson, 2020). Principals not only set the vision and strategic direction for the incorporation of Gen-AI but also create an environment conducive to its successful integration (Seiradakis, 2023). This involves fostering a culture of innovation, encouraging professional development, and ensuring that staff and students are prepared to engage with new technologies. School leaders hold a unique position where they bridge the gap between technological advancements and pedagogical practices (Kilag et al., 2023). Their leadership is crucial in aligning Gen-AI technologies with educational goals and curricular needs (Fullan et al., 2023). They are responsible for ensuring that the integration of Gen-AI is not just a technological upgrade but a strategic enhancement to the educational process (Reyneke, 2023). This involves understanding the capabilities of Gen-AI and how they can be leveraged to improve teaching effectiveness, student engagement, and learning outcomes. Another critical role of school leaders in the context of Gen-AI integration is to oversee its ethical and equitable implementation (Farzan, 2023). As Gen-AI technologies raise concerns about data privacy, bias, and equity, leaders must ensure that these tools are used responsibly and benefit all students (Foltynek et al., 2023). They are tasked with navigating the complex ethical landscape, making decisions that uphold the values of the educational community while harnessing the potential of Gen-AI (Tabish, 2023). Implementing Gen-AI in education is not merely a technical challenge; it involves significant change management (Baxter et al., 2023). School leaders are at the forefront of this process, managing transitions, addressing resistance, and communicating effectively with various stakeholders, including teachers, students, parents, and the broader community. Their leadership is essential in building consensus, fostering collaboration, and ensuring that the transition to Gen-AI-enhanced education is smooth and inclusive (Tyson & Sauers, 2021). School leaders play a crucial role in preparing their institutions for future challenges and opportunities presented by Gen-AI (Wu, 2023; Yu & Guo, 2023). Based on these responsibilities and challenges, the importance of school leaders in the implementation of Gen-AI technologies in education cannot be overstated. Their leadership, vision, and decision-making are fundamental to ensuring that Gen-AI is integrated effectively, ethically, and in alignment with educational goals. As Gen-AI continues to advance, it becomes increasingly important for educators to adapt their professional roles to leverage the benefits of generative Gen-AI in educational settings.This adjustment in roles will require school leadership to understand and navigate the implications of integrating generative Gen-AI in education (Crawford et al., 2023). Policy documents can provide valuable insights into the implications of integrating generative Gen-AI in education and guide school leadership in effectively managing this transformative process (Chan, 2023). To fully comprehend the multifaceted implications of Gen-AI integration in education, particularly for school leadership, it is essential to employ a comprehensive analytical lens. Bolman and Deal's Four Frame Theory offers such a perspective, providing a holistic approach to organizational analysis and leadership. By examining policy documents through Bolman and Deal's Four Frame Theory, school leaders can gain a comprehensive understanding of the implications of integrating generative Gen-AI in education and develop strategies to effectively implement and manage Gen-AI technologies in educational settings. Through Bolman and Deal's Four Frame Theory, school leaders can analyze the implications of integrating generative Gen-AI in education from different perspectives: structural, human resources, political, and symbolic.

Bolman and Deal's Four Frame Theorycould act as an effective guideline for educational leaders aiming to thoughtfully integrate or improve social media usage into their organizations (Yilmaz et al., 2021). This is because Bolman and Deal's Four Frame Theory is chosen for its comprehensive approach, allowing for a multifaceted analysis of Gen-AI integration in education by addressing not only the technical and structural aspects but also considering the human, cultural, and political dimensions that are crucial for effective leadership and policy development. This theory's applicability across various sectors, including technology, where it has been used to navigate complex organizational changes and innovation, makes it particularly relevant for examining the nuanced challenges and opportunities presented by Gen-AI in educational leadership. It aids in strategizing the incorporation of Gen-AI, ensuring that it aligns with the institution’s goals, culture, and stakeholder interests,

while also addressing the practicalities of implementation and the symbolic meaning of Gen-AI in the educational context. Indeed, existing literature reveals several studies (for example, Linder & Zhang, 2020; Rawlinson, 2015; Wilson, 2018) focusing on the integration of technology and artificial intelligence through four frame theory within various sectors, illustrating parallels and offering insights that are applicable to the field of education. These studies provide a foundational understanding of the multifaceted challenges and strategies associated with the adoption of advanced technologies, which can inform and enhance the discourse on Gen-AI integration.

Bolman and Deal's Four Frame Theory offers a comprehensive framework for understanding educational institutions as organizations. Each frame – Structural, Human Resources, Political, and Symbolic – provides a unique lens through which to view and address organizational challenges and opportunities (Bolman & Deal, 2017). The Structural Frame focuses on the architecture of organizations, emphasizing roles, policies, procedures, and hierarchies. It views organizations like machines, where clarity and efficiency in structure and processes are key. In education, this frame is useful for understanding how schools are organized, how they function, and how they respond to challenges like technology integration (Photinopoulos, 2021). The Human Resources Frame centers on the people within organizations, focusing on their needs, skills, and relationships. It emphasizes the importance of aligning organizational goals with human needs, thereby fostering motivation, empowerment, and personal development (Fleming-May & Douglass, 2014). The Political Frame views organizations as arenas of competition, where different groups vie for power and resources. It emphasizes the role of power dynamics, conflict, and coalition-building in organizational decision-making (Bolman & Deal, 2014). The Cultural Symbols Frame focuses on the symbolic elements of organizations, such as culture, rituals, stories, and values. It posits that what is most important in organizations is not necessarily what is written or said, but what is interpreted and believed (Holmes, 2023). Research in this area might explore how school culture influences the adoption of new technologies and educational practices. This frame is particularly relevant in understanding how school leaderscan shape the narrative around Gen-AI in education, creating a culture that embraces innovation while honoring traditional values and beliefs. As it is seen, Bolman and Deal's Four Frame Theory provides a multifaceted approach to understanding and addressing the complexities of educational leadership, especially in the context of integrating Gen-AI and other emerging technologies. Each frame offers valuable insights into different aspects of organizational dynamics and is instrumental in guiding effective leadership and management strategies in educational settings.

Statement of the research problem

The integration of Gen-AI into the educational sector represents a significant shift in the landscape of teaching, learning, and educational administration. While Gen-AI offers promising enhancements in terms of personalized learning, operational efficiency, and data-driven decision-making, it also introduces complex challenges and implications for school leadership. The problem at the heart of this research is to understand and articulate these implications, particularly focusing on the roles and responsibilities of school leaders. School leaders, as pivotal figures in educational leadership, find themselves at the forefront of this transformation. Their roles are not only administrative but also involve acting as visionaries, change managers, ethical guides, and cultural leaders. The challenge is to understand how these roles are reshaped through the integration of Gen-AI. There is a need to identify the new skills, competencies, and approaches required for leaders to effectively manage the transition to Gen-AI-enhanced education systems. An additional dimension involvesthe application of Bolman and Deal's Four Frame Theory in analyzing the impact of Gen-AI on school leadership. Each frame – "Structural, Human Resources, Political, and Symbolic– provides a different lens through which the effects of Gen-AI integration can be examined. Lastly, the problem extends to understanding the global perspective on Gen-AI integration in education. Analyzing international policies and frameworks from regions such as Türkiye, Australia, The United States of America (USA), The United Kingdom of Great Britain and Northern Ireland (UK), The United Nations Educational, Scientific and Cultural Organization (UNESCO), The Organisation for Economic Co-operation and Development (OECD), The European Union (EU), and France provides a developing a comprehensive understanding of the global trends and challenges faced by school leaders in different contexts. This comparative analysis is crucial for developing a comprehensive view of the role of Gen-AI in shaping educational leadership globally.

Purpose and Significance of the Study

The primary purpose of this study is to investigate and articulate the multifaceted implications of integrating artificial intelligence (Gen-AI) into education, with a specific focus on the roles and responsibilities of school leaders. By employing Bolman and Deal's Four Frame Theory, the study aims to provide a comprehensive analysis of the structural, human resource, political, and symbolic dimensions of Gen-AI integration in education. This research is significant for several key reasons. Gen-AI is rapidly becoming a transformative force in education. This study is significant as it addresses the urgent need to understand and navigate this transformation, particularly from the perspective of school leadership. School leaders are crucial agents in the successful integration of Gen-AI in educational settings. The study seeks to provide them with insights and frameworks to effectively manage the transition to Gen-AI-enhanced educational systems, ensuring that they are equipped to face new challenges and harness the potential of Gen-AI technologies. By analyzing international policies and frameworks on Gen-AI in education from different regions, the study aims to inform policy-makers and educational leaders. It will provide a global perspective on best practices, challenges, and strategies for integrating Gen-AI in education, thus contributing to informed decision-making and policy development. The study bridges the gap between technological advancements and educational leadership. It offers a nuanced understanding of how Gen-AI can be leveraged to improve educational outcomes while also highlighting the ethical, cultural, and human resource challenges associated with its adoption. By exploring the human resource and structural implications of Gen-AI, the study contributes to discussions on educational equity and quality. It examines how Gen-AI can be used to create more personalized and inclusive learning experiences, and what this means for the roles of school leaders. The study extends beyond the practical and technical aspects of Gen-AI integration, delving into the cultural and symbolic impacts on educational institutions. This is significant for understanding how Gen-AI shapes the narrative, values, and beliefs within the school community. Finally, this study lays the groundwork for future research in the field of Gen-AI in education. By identifying gaps, challenges, and areas of potential, it sets the stage for further exploration and innovation in educational technology and leadership. In essence, the purpose and significance of this study lie in its comprehensive approach to understanding and guiding the integration of Gen-AI in education. It aims to provide school leaders, policymakers, educators, and researchers with valuable insights and tools to navigate the complex landscape of Gen-AI in education, ultimately contributing to the advancement of educational practice and leadership in the digital age. Based on these aims, the study addresses the following central and sub-research questions.

Research questions

The core of this study revolves around a central research question, supported by several sub-questions aligned with Bolman and Deal's Four Frame Theory. These questions are designed to guide the investigation into the multifaceted impact of integrating Gen-AI in education, particularly focusing on the roles and responsibilities of school leaders. How does the integration of Gen-AI into education affect the roles and responsibilities of school leaders when viewed through Bolman and Deal's Four Frame Theory?

These sub-research questions guided this study:

RQ 1. How does the integration of Gen-AI into education change the structural framework in which school leaders operate? What changes in school governance and policy implementation are necessary to adapt to Gen-AI technologies?

RQ 2. How does Gen-AI integration affect the human resource management responsibilities of school leaders? In what ways does Gen-AI impact teacher training, staff development, and student engagement?

RQ 3. How does Gen-AI influence power dynamics and decision-making processes in educational organizations? What are the political implications for school leaders in the integration of Gen-AI?

RQ 4. How does the inclusion of Gen-AI in education affect the culture and symbolic aspects of educational organizations? What role do school leaders play in shaping the narrative and perception of Gen-AI within the school community?

These research questions aim to provide a structured inquiry into the complex dynamics of Gen-AI integration in education. They facilitate an in-depth analysis of the various challenges and opportunities Gen-AI presents, from structural changes in governance to shifts in cultural perceptions. By addressing these questions, the study seeks to offer a holistic understanding of how Gen-AI redefines the roles and responsibilities of school leaders, aiding in the development of effective strategies and policies for the future of educational leadership.

METHOD

Research Design

This study adopts a qualitative research design, focusing solely on document analysis. Given the specific focus on document analysis for this research, the methodology section is revised to detail the approach and procedures involved in conducting a comprehensive document analysis (Asdal & Reinertsen, 2021; Bauchner, 2014; Groenland & Dana, 2020). This research design is exclusively qualitative, focusing on analyzing various international policy documents related to the integration of Gen-AI in education and its implications for school leadership. This approach is chosen for its effectiveness in extracting and interpreting data from textual materials, which in this case are policy documents.

Data Collection

The data collection for this research involves a detailed analysis of policy documents related to the integration of artificial intelligence (Gen-AI) in education. Documents were selected based on their relevance to Gen-AI in education and their influence on educational policy and leadership. This includes policy documents and official reports from various countries and international organizations. The policy documents were sourced from official websites of education ministries, international organizations (such as UNESCO, OECD), and government portals of the selected countries (including Turkey, Australia, the USA, EU, and France). Documents included for analysis are those that specifically address Gen-AI in education, its implementation strategies, ethical considerations, and implications for educational leadership and school governance. The selection of documents focused on those published within the last decade to ensure relevance to the current state of Gen-AI integration in education. Documents were retrieved through online searches using keywords such as "Gen-AI in education policy", "educational leadership and Gen-AI", "Gen-AI ethics in education", and the names of the selected regions and organizations. Collected documents were cataloged systematically, recording their source, publication date, and main focus. This organization aids in managing and accessing the documents efficiently during analysis. The selected documents and links are as follows:

Table 1. Policy Documents on Artificial Intelligence in Education (2021-2023)

	Country / Organization	Policy Document & Report	Year	Link to Access
1	Türkiye	Ulusal Yapay Zekâ Stratejisi 2021-2025	2021	https://cbddo.gov.tr/uyzs
2	Australia	Framework for Generative Gen-AI in Schools	2023	https://www.education.gov.au/schooling/resources/australian-framework-generative-artificial-intelligence-ai-schools
3	Fransa	Stratégie Nationale pour l'IA 2ème	2021	https://www.economie.gouv.fr/strategie-nationale-intelligence-artificielle#
4	USA	Artificial Intelligence and the Future of Teaching and Learning	2023	https://www2.ed.gov/documents/ai-report/ai-report.pdf
5	UK	Understanding Gen-AI for School: Tips for School Leaders	2023	https://www.ai-in-education.co.uk/resources/understanding-ai-for-school-tips-for-school-leaders
6	UK	National Gen-AI Strategy	2021	https://assets.publishing.service.gov.uk/media/614db4d1e90e077a2cbdf3c4/National_Gen-AI_Strategy_-_PDF_version.pdf
7	UK	Generative artificial intelligence (Gen-AI) in education	2023	https://www.gov.uk/government/publications/generative-artificial-intelligence-in-education/generative-artificial-intelligence-ai-in-education
8	UK	Generative Gen-AI in education	2023	nationalarchives.gov.uk/doc/open-government-licence/version/3.
9	Canada	Talent for the Future: Gen-AI Education for K-12	2021	https://www.asiapacific.ca/publication/ai-education-k-12-canada-and-south-korea
10	South Korea	Talent for the Future: Gen-AI Education for K-12	2021	https://www.asiapacific.ca/publication/ai-education-k-12-canada-and-south-korea
11	UNESCO	Gen-AI and education guidance for policy-makers	2021	https://unesdoc.unesco.org/ark:/48223/pf0000376709
12	UNESCO	Guidance for generative Gen-AI in education and research	2023	https://unesdoc.unesco.org/ark:/48223/pf0000386693

13	UNESCO	Recommendation on the Ethics of Gen-AI	2021	https://unesdoc.unesco.org/ark:/48223/pf0000385082
14	UNESCO	Guidelines for ICT in education policies and masterplans	2022	https://unesdoc.unesco.org/ark:/48223/pf0000380926
15	European Union	Artificial Intelligence and Education	2022	https://rm.coe.int/artificial-intelligence-and-education-a-critical-view-through-the-lens/1680a886bd

The criteria for selecting documents in this research were meticulously established to ensure a comprehensive and authoritative understanding of global trends and best practices in Gen-AI integration in education. The significance of the chosen reports and policy documents lies in their origination from countries and organizations at the forefront of Gen-AI technological advancement and educational policy development. These documents represent a broad spectrum of socio-economic contexts, providing diverse insights into the strategies and ethical considerations surrounding Gen-AI in education. Countries like the USA, Australia, Turkey, the UK, France, Canada, and South Korea are known for their progressive adoption of Gen-AI technologies, making their policy documents critical for understanding how Gen-AI is shaping educational leadership globally. Additionally, international organizations such as UNESCO and the European Union are instrumental in setting global standards and guidelines, which significantly influence national policies and educational frameworks worldwide. The inclusion of their documents ensures that the research captures a holistic view that is both influential and reflective of the international discourse on Gen-AI in education.

Data Analysis

The primary method of analysis was content analysis, which involved systematically examining and interpreting the text to identify patterns, themes, biases, and meanings. This involved reading and re-reading the documents to gain a deep understanding of their content. The documents were coded using both pre-determined categories (based on Bolman and Deal's Four Frame Theory) and emergent codes that arose from the data. Bolman and Deal's Four Frame Theory was used as an analytical framework to interpret the findings. This framework provided a structured lens to examine how Gen-AI integration in education is addressed in policy documents across the structural, human resources, political, and symbolic dimensions. Each document was coded with tags corresponding to the four frames. Instances, phrases, or sections in the documents that reflect elements of these frames were identified and tagged for in-depth analysis. This approach allowed for both theory-driven and data-driven analysis. Following coding, a thematic analysis was conducted to identify and analyze themes related to the integration of Gen-AI in education and its implications for school leadership. To enhance the validity and reliability of the findings, triangulation was employed by comparing and cross-referencing data across multiple documents. Preliminary findings were subjected to peer review by experts in educational leadership and Gen-AI to ensure the accuracy and credibility of the interpretations. All stages of the document analysis process were meticulously documented, including search strategies, selection criteria, coding frameworks, and thematic analysis procedures.

Research Ethics

The analysis respects the intellectual property rights of the document authors and sources. Only publicly available and officially published documents have been used, and proper citations have been provided. The Ethics Committee Approval for this study was granted by the 'Amasya University Non-Interventional Clinical Research Ethics Committee' Approval was obtained with decision number 179032 on the date 13.02.2024.

FINDINGS

Türkiye National Gen-AI Strategy 2021-2025

Table 2 explains the strategic priorities and corresponding actions outlined in the Türkiye National Gen-AI Strategy for 2021-2025, outlining roles and initiatives for effective Gen-AI integration

Table 2. Türkiye National Gen-AI Strategy 2021-2025

	Implications for SL	Supporting Quotations & Evidence from Document
SF	School Leaders (SLs) need to adapt to and facilitate structural transformations that accommodate Gen-AI in educational systems. Leadership roles may evolve to include overseeing the integration of Gen-AI-driven processes and systems. The strategy highlights the importance of adapting to socio-economic transformations driven by Gen-AI, indicating a need forstructural adaptation in educational institutions.	The establishment of the " Education Technology Incubation and Innovation Center" by the Ministry of National Education in 2021 indicates a shift towards an Gen-AI-enabled structural framework in education. This suggests that school leaders will need to adapt to new technology-driven administrative and educational processes
HRF	SLs will play a crucial role in managing the human resource aspects, including training and developing staff to meet the demands of an Gen-AI-driven educational environment. The focus on increasing the number of Gen-AI experts implies a need for leaders to facilitate professional development opportunities in Gen-AI.	The Gen-AI Education Project, run by the Ministry's General Directorate of Innovation and Educational Technologies, aims to integrate Gen-AI education and coding into teaching plans and practices. This project highlights the necessity for school leaders to focus on teacher training and professional development in Gen-AI, emphasizing the importance of equipping educators with Gen-AI competencies.
PF	SLs must navigate the political implications of Gen-AI, including resource allocation and stakeholder management within the educational sector. The development and implementation of Gen-AI strategies may involve negotiating with various stakeholders, including government bodies and private sector entities. The strategy involves comprehensive planning aligned with national policy documents and international trends, indicating the political nature of Gen-AI strategy implementation.	The emphasis on developing Gen-AI expertise and improving policy-making capacity in this field underscores the changing dynamics in decision-making processes within educational organizations. Moreover, School leaders will be key players in navigating these new dynamics, balancing traditional leadership roles with the evolving demands of Gen-AI-driven educational models.
SF	SLs are tasked with shaping the narrative around Gen-AI in education, influencing cultural perceptions and attitudes towards Gen-AI among students and staff. Leaders must actively embed Gen-AI within educational culture, ensuring alignment with existing values and ethical standards.The document outlines the need for education that is in line with international standards and ethical principles, highlighting the cultural and symbolic aspects of Gen-AI integration in education.	The "Deneyap Türkiye" project, aiming to equip talented young students with Gen-AI competencies before higher education, reflects a cultural shift towards embracing Gen-AI in education. School leaders have a significant role in shaping this cultural narrative by fostering an environment that values Gen-AI literacy and aligns with the national Gen-AI strategy.

Note: SF = Structural Frame, HRF = Human Resources Frame, PF = Political Frame, SF = Symbolic Frame.

The "Türkiye National Gen-AI Strategy 2021-2025" emphasizes the need for school leaders to adapt to structural changes, manage human resources effectively, navigate organizational politics, and influence the cultural narrative in the integration of Gen-AI into education. This includes evolving leadership roles to oversee Gen-AI integration, facilitating staff training in Gen-AI, negotiating with stakeholders, and aligning Gen-AI education with ethical standards and international trends. The strategy underscores the comprehensive nature of Gen-AI integration, requiring adaptations across structural, human resource, political, and cultural dimensions in educational institutions. These findings reflect a holistic approach to Gen-AI integration in education, highlighting the multi-faceted role of school leadership in adapting to technological advancements.

Australia Framework for Generative Gen-AI in Schools

Table 3 explains the strategic priorities of the Australia Framework for Generative Gen-AI in Schools, detailing the implications for school leadership and the supporting evidence.

Table 3. Australia Framework for Generative Gen-AI in Schools

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs need to embrace and facilitate the integration of generative Gen-AI into the existing educational structure, ensuring alignment with the broader national education policies.	"The Framework aligns to existing national policies and goals".
HRF	SLs should focus on enhancing teacher and staff competencies in generative Gen-AI, aligning with the Framework's emphasis on building Gen-AI understanding and skills.	"…teachers are recognised and respected as the subject matter experts within the classroom" (in the context of using Gen-AI tools)…"
PF	SLs must navigate the political dimensions of Gen-AI integration, ensuring adherence to national and international standards and collaboration with various stakeholders.	"The Framework was developed in consultation with unions teachers, students, industry, and academics".
SF	SLs play a key role in shaping the cultural perception of Gen-AI, promoting its ethical use and integrating it into the school's culture.	"Generative Gen-AI tools are used in ways that respect human and worker rights including individual autonomy and dignity".

The "Australia Framework for Generative Gen-AI in Schools" highlights the necessity for school leaders to incorporate generative Gen-AI into educational structures, enhance staff competencies in Gen-AI, manage political aspects of Gen-AI integration, and shape the cultural perception of Gen-AI in schools. This involves aligning Gen-AI integration with national education policies, fostering Gen-AI skills among teachers, adhering to standards, and promoting ethical Gen-AI use within the school culture. The Framework emphasizes a comprehensive approach, combining structural, human resource, political, and cultural strategies to effectively integrate generative Gen-AI in education. These findings indicate a strategic and multi-dimensional effort required from school leaders to successfully integrate generative Gen-AI, ensuring it becomes an integral and positively perceived part of the educational landscape.

France National Strategy for Gen-AI

Table 4 explains the key strategic priorities of the France National Strategy for Gen-AI, emphasizing the roles of school leadership in Gen-AI research, development, and ethical integration within the educational framework, alongside corroborating evidence.

Table 4. France National Strategy for Gen-AI

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should emphasize on strengtheningAI research and development infrastructure, indicating a need for school leaders to align educational structures with national Gen-AI strategy priorities. The strategy emphasizes the development of Gen-AI research infrastructure, indicating a need for educational structures to align with national priorities in Gen-AI.	"The creation of 4 new interdisciplinary Gen-AI Institutes...established partnerships with dozens of companies of all sizes" (Page 10)
HRF	SLs should focus on training and developing Gen-AI skills, suggesting that school leaders must prioritize Gen-AI education and professional development. There's a focus on training and developing Gen-AI competencies, suggesting school leaders should prioritize Gen-AI education and professional development.	"nearly 370 additional thesis contracts including around a hundred theses in CIFRE companies or 500 new doctors in Gen-AI in total" (Page 10). The strategy mentions "nearly 370 additional thesis contracts" and "500 new doctors in Gen-AI" (Page 10), highlighting the importance of human resource development in Gen-AI.
PF	SLs should collaborate with various stakeholders in Gen-AI development and training, highlighting the role of school leaders in facilitating these partnerships. The strategy necessitates collaboration with stakeholders, indicating the importance of political acumen for school leaders in Gen-AI integration.	"Franco-German DEEL program...contributes to the project from the Toulouse hub" (Page 22). The mention of "Franco-German DEEL program" and its contribution from the Toulouse hub (Page 22) underscores the political nature of Gen-AI strategy implementation.
SF	SLs should focus on the emphasis on ethical and trusted Gen-AI indicates the importance of fostering a culture of ethical Gen-AI use within educational settings. There's an emphasis on ethical Gen-AI, indicating a need for school leaders to foster a culture of ethical Gen-AI use in education.	"Grand Challenge 'Secure, certify and make systems based on artificial intelligence reliable'" (Page 23). The strategy focuses on "Grand Challenge 'Secure, certify and make systems based on artificial intelligence reliable'" (Page 23), highlighting the cultural and symbolic importance of ethical Gen-AI.

The "France National Strategy for Gen-AI" underscores the need for school leaders to strengthen Gen-AI research infrastructure, develop Gen-AI competencies in education, collaborate with stakeholders, and promote ethical Gen-AI use within educational settings. This involves aligning educational structures with national Gen-AI strategy priorities, prioritizing Gen-AI education and professional development, and fostering partnerships for Gen-AI development and training. The strategy highlights both the importance of integrating Gen-AI into the educational curriculum and the role of school leadership in ensuring ethical Gen-AI practices. These findings illustrate a comprehensive and strategic approach to integrating Gen-AI in education, with a strong emphasis on ethical considerations and the development of Gen-AI skills and infrastructure.

USA Gen-AI and the Future of Teaching and Learning

Table 5 explains the strategic initiatives and implications for school leadership within the context of the evolving landscape of Gen-AI in the U.S. educational system.

Table 5. USA Gen-AI and the Future of Teaching and Learning

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should focus on aligning Gen-AI integration with the broader vision of learning, ensuring that Gen-AI tools complement and enhance the educational system rather than narrowing it.	"The Department is committed to supporting the use of technology to improve teaching and learning..." (Introduction). “We should differentiate between products that have simple Gen-AI-like features inside and products that have more sophisticated Gen-AI models" and "the full system for learning is broader than its Gen-AI component".
HRF	SLs must prioritize addressing the challenges faced by teachers, including leveraging Gen-AI to reduce routine burdens and enhance teaching practices.	"Educators are recognized as the subject matter experts... [and] exploring Gen-AI tools" (Rising Interest in Gen-AI in Education). "Gen-AI assistants to reduce routine teaching burdens; Gen-AI that provides teachers with recommendations for their students’ needs and extends their work with students; and Gen-AI that helps teachers to reflect, plan and improve their practice".
PF	SLs need to maintain a focus on educator-centered Gen-AI applications, ensuring Gen-AI supports rather than replaces human educators and decision-makers.	"The Department works closely with educational constituents..." (Toward Policies for Gen-AI in Education). "Always center educators (ACE)... ACE is not just about making teachers’ jobs easier but also making it possible to do what most teachers want to do" .
SF	SLs should advocate for a human-centered approach to Gen-AI in education, emphasizing the importance of human judgment and contextual understanding in Gen-AI applications.	"Ethical problems will occur in education too..." (Toward Policies for Gen-AI in Education). "Human in the Loop Gen-AI... Gen-AI can replace a teacher, a guardian, or an educational leader as the custodian of their students’ learning" and "We can use Gen-AI to study the diversity the multiplicity of effective learning approaches".

The "USA Gen-AI and the Future of Teaching and Learning" report calls for school leaders to ensure Gen-AI integration complements the educational system, supports teachers, focuses on educator-centered Gen-AI applications, and advocates for a human-centered approach in Gen-AI use. This involves aligning Gen-AI with the broader vision of learning, using Gen-AI to alleviate routine tasks for teachers, ensuring Gen-AI supports rather than replaces human educators, and emphasizing the importance of human judgment in Gen-AI applications. The report highlights the need for a balanced approach to Gen-AI in education, where Gen-AI tools are integrated as supportive and enhancing elements, not as replacements for human educators and decision-makers. These findings demonstrate a clear emphasis on the supportive role of Gen-AI in education, advocating for a synergy between Gen-AI tools and human capabilities within the teaching and learning process.

UK Understanding Gen-AI for School: Tips for School Leaders

Table 6 explains actionable guidance for school leaders in the UK on the adoption and integration of Gen-AI in educational settings, emphasizing the need for thoughtful alignment with pedagogical objectives and ethical considerations.

Table 6. UK Understanding Gen-AI for School: Tips for School Leaders

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs must ensure that Gen-AI is approached thoughtfully and aligns with the vision for teaching and learning, integrating Gen-AI into the structural framework of the school.	"Whether you are excited or concerned about Gen-AI as a school leader you have a responsibility to ensure Gen-AI is approached thoughtfully and appropriately in your school community and informs your vision for teaching and learning." (Page 1).
HRF	SLs need to be prepared for the evolving impact of Gen-AI on jobs and skills, adapting human resources strategies and professional development accordingly.	"We're still at the beginning of the development of the technology and the only consensus about the impact of Gen-AI is that it will have one but it's not yet possible to know exactly what." (Page 5).
PF	SLs should navigate the integration of Gen-AI with a clear understanding of its potential impact and implications, making informed decisions without rushing into significant curriculum changes.	"Take discussion in this area with a pinch of salt and don't make any knee jerk moves to significantly change curriculums just yet." (Page 5).
SF	SLs should emphasize fostering ethical Gen-AI use and digital citizenship, educating students about the ethical implications of Gen-AI, including biases, privacy concerns, and algorithmic fairness.	"Foster Ethical Gen-AI Use and Digital Citizenship: — Within PSHE Citizenship or Computing how could you educate students about the ethical implications of Gen-AI including biases privacy concerns and algorithmic fairness?" (Page 10).

The "UK Understanding Gen-AI for School: Tips for School Leaders" emphasizes the importance of integrating Gen-AI thoughtfully into the school's structural framework, adapting human resource strategies to the evolving impact of Gen-AI on jobs and skills, and making informed decisions on curriculum changes. School leaders are encouraged to navigate Gen-AI integration with awareness of its implications, and to foster ethical Gen-AI use and digital citizenship among students, addressing issues like biases, privacy, and algorithmic fairness. The guidelines highlight the multi-dimensional impact of Gen-AI in education, focusing on structural alignment, human resource adaptation, informed organizational decision-making, and the promotion of ethical Gen-AI practices. These findings suggest a cautious yet proactive approach towards Gen-AI integration in schools, underscoring the need for a balance between technological advancement and ethical considerations in education.

Canada Talent for the Future: Gen-AI Education for K-12

Table 10 explains the strategic imperatives for the integration of Gen-AI in K-12 education in Canada, outlining the roles of school leadership against the backdrop of supporting evidence and quotations from relevant documents.

Table 10. Canada Talent for the Future: Gen-AI Education for K-12

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should recognize and adapt to the transformative potential of Gen-AI in the education sector, particularly in enhancing teaching effectiveness and pupil engagement. This involves incorporating Gen-AI in curriculum design and learning methodologies. School leaders need to adapt educational structures to make Gen-AI education accessible to all students, not just those specializing in computing science. This involves integrating Gen-AI into various aspects of the educational system, from curriculum design to teaching methodologies.	"Reported benefits for pupils included enhanced engagement and improved accessibility and inclusion." (Page 7) "Resources to make Gen-AI education accessible to all not just to gifted or advanced students specializing in computing science."
HRF	SLs must address challenges and potential concerns about GenAI use in education, such as over-reliance on Gen-AI tools, academic misconduct, and data privacy risks. It's crucial to ensure that staff and students are well-equipped to use Gen-AI tools responsibly. Leaders must focus on developing the skill set of educators to teach Gen-AI effectively. This may involve targeted recruitment strategies and professional development programs to address the competition with the industry for qualified computing science educators.	"Prominent concerns included over-reliance on GenAI tools... academic misconduct... and data protection and privacy risks." (Page 7). "Educators do not necessarily have the skill set to teach Gen-AI and recruitment of good computing science educators can be challenging due to the competition with the industry."
PF	SLs should be prepared to address the diverse opinions and concerns regarding Gen-AI use, engaging with various stakeholders to shape a balanced approach to Gen-AI integration that addresses potential risks while maximizing benefits. School leaders should navigate the decentralized nature of Gen-AI education in Canada, leveraging resources and support from federal programs and local initiatives. They need to be proactive in incorporating Gen-AI education into their curriculums and staying updated with evolving educational needs post-pandemic.	"Broad acknowledgement of a need to balance risk and reward." (Page 7). "The federal government has been supportive of Gen-AI education and training... creating a supportive policy and educational environment."
SF	SLs should promote a culture of critical engagement with Gen-AI, balancing its use with human judgment and creativity in teaching and learning processes. School leaders should promote a culture that acknowledges the importance of Gen-AI education, focusing on the understanding of Gen-AI's main concepts and its societal implications. This involves fostering a learning environment where Gen-AI is integrated into the broader curriculum, aligning with national educational frameworks.	"The limitations of generative Gen-AI tools require professional judgement to check for appropriateness and accuracy." "…developed an Gen-AI Education Framework with data perception representation & reasoning learning natural interaction and societal impacts as its six main themes." (Page 7).

The "Canada Talent for the Future: Gen-AI Education for K-12" report stresses the importance for school leaders to adapt educational structures for Gen-AI integration, addressing challenges such as over-reliance on Gen-AI tools and data privacy, and fostering a culture of critical engagement with Gen-AI in teaching and learning. This includes making Gen-AI education accessible to all students, developing educators' skills to teach Gen-AI effectively, navigating the decentralized nature of Gen-AI education in Canada, and aligning Gen-AI education with national frameworks. The report highlights the need for targeted recruitment and professional development for educators, proactive curriculum incorporation, and balancing Gen-AI use with human judgment and creativity. These findings underline a comprehensive approach to Gen-AI integration in education, emphasizing the need for strategic adaptation and the cultivation of an Gen-AI-literate and ethically aware learning environment.

South Korea Talent for the Future: Gen-AI Education for K-12

Table 11 explains the strategic vision and initiatives for embedding Gen-AI in K-12 education in South Korea, addressing leadership roles and presenting supporting statements from key policy documents.

Table 11. South Korea Talent for the Future: Gen-AI Education for K-12

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs in South Korea are expected to align their educational strategies with the government's active commitment to incorporating Gen-AI into K-12 education. This includes updating the public school curriculum to include Gen-AI coursework and ensuring its gradual introduction across different educational levels.	"South Korea has an active and committed government currently acting on plans and promising significant funding to update and roll out a K-12 public school curriculum with Gen-AI education coursework." (Introduction, Page 4).
HRF	SLs must address the need for training educators in Gen-AI, as there is a challenge in recruiting computing science educators due to industry competition. This involves developing specialized training programs and resources for teachers.	"Educators do not necessarily have the skill set to teach Gen-AI and recruitment of good computing science educators can be challenging due to the competition with the industry." (Page 4)
PF	SLs should navigate the decentralized and varying access to quality Gen-AI education across the country. This involves engaging with civil society organization programs and balancing the curriculum's Gen-AI components with traditional subjects.	"Gen-AI education remains in its infancy and it will likely remain decentralized across the country and reliant on civil society organization programs..." (Page 5)
SF	SLs should promote an understanding of Gen-AI's societal impacts and fostering an Gen-AI literate society is crucial. Leaders should focus on integrating Gen-AI education that covers both technical and ethical aspects.	"The limitations of generative Gen-AI tools... require professional judgement to check for appropriateness and accuracy." (Page 7)

The "South Korea Talent for the Future: Gen-AI Education for K-12" report emphasizes the need for leaders to align educational strategies with the government's commitment to Gen-AI in education, address the challenge of training educators in Gen-AI due to industry competition, and manage decentralized access to Gen-AI education. This includes updating curricula to incorporate Gen-AI coursework, developing specialized training for teachers, engaging with civil society programs, and balancing Gen-AI components with traditional subjects. Additionally, there is a focus on fostering an Gen-AI-literate society by promoting an understanding of Gen-AI's societal impacts and integrating education on both technical and ethical aspects of Gen-AI. These findings highlight a strategic approach to Gen-AI integration in South Korean education, stressing the importance of both technical proficiency and ethical understanding in creating a balanced and inclusive Gen-AI educational framework.

UNESCO Gen-AI and Education Guidance for Policy-Makers

Table 12 explains the UNESCO guidelines for policymakers on the application of Gen-AI in education, detailing leadership strategies and underpinning these with supportive excerpts.

Table 12. UNESCO Gen-AI and Education Guidance for Policy-Makers

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs must understand the complex and rapidly evolving nature of Gen-AI and its broad implications for education. They should prepare to adapt educational structures accordingly, integrating Gen-AI in ways that enhance learning and teaching processes. School leaders must adapt to the transformative role of Gen-AI in education, which is reshaping teaching and learning foundations. This requires a strategic approach to integrate 'intelligent', 'adaptive', and 'personalized' learning systems into educational structures.	"Rapid technological developments... have outpaced policy debates and regulatory frameworks." (Introduction)"The application of Gen-AI in educational contexts raises profound questions – for example about what should be taught and how the evolving role of teachers and Gen-AI's social and ethical implications." (Introduction)
HRF	SLs must emphasize on developing educators' skills in Gen-AI, including its ethical use and implications. Leaders should focus on professional development programs to ensure effective Gen-AI integration in teaching and learning. School leaders must emphasize the need for inclusive and equitable education, leaders should ensure that Gen-AI's application in education enhances lifelong learning opportunities for all. This involves understanding Gen-AI's diverse implications based on national and socio-economic contexts.	"This UNESCO guidance seeks to help policy-makers better understand the possibilities and implications of Gen-AI for teaching and learning so that its application in educational contexts genuinely helps achieve SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." (Introduction) "Educational equity and access are challenges." (Section 3)
PF	SLs should navigate the policy environment and engaging with diverse stakeholders, including governments and private entities, is crucial. Leaders should be aware of and contribute to policy discussions on Gen-AI in education. Leaders should be cognizant of the risks of increased inequality and socio-political instability due to Gen-AI, particularly affecting the technologically disadvantaged and underrepresented. Addressing this requires developing low-cost Gen-AI models and inclusive policies.	"With Gen-AI in general the concern is that if we continue blindly forward we should expect to see increased inequality alongside economic disruption social unrest and in some cases political instability..." (Introduction). "The deployment and use of Gen-AI in education must be guided by the core principles of inclusion and equity." (Foreword)
SF	SLs should proote a culture of critical engagement with Gen-AI, balancing its use with human judgment and creativity in teaching and learning processes. School leaders should promote Gen-AI in education should focus on enhancing inclusion, equity, quality of learning, education management, and pedagogy. Leaders must engage in in-depth discussions on Gen-AI's role and its potential to improve various aspects of education.	"This publication begins with a brief introduction to Gen-AI – what it is and how it works – to provide a foundation for an in-depth discussion of the interaction between Gen-AI and education. This is followed by an introduction to the multiple ways in which Gen-AI is being used in education together with a discussion about how Gen-AI might enhance inclusion and equity quality of learning education management and pedagogy." (Introduction). "The application of Gen-AI in educational contexts raises profound questions about what should be taught and how, the evolving role of teachers, and Gen-AI's social and ethical implications." (Introduction)

The "UNESCO Gen-AI and Education Guidance for Policy-Makers" report highlights the need for leaders to adapt educational structures for Gen-AI integration, emphasizing the development of educators' skills in Gen-AI and its ethical use, and navigating a complex policy environment with diverse stakeholders. This adaptation involves integrating intelligent, adaptive, and personalized learning systems, ensuring Gen-AI applications are inclusive and equitable, and developing low-cost Gen-AI models and inclusive policies to address potential inequalities. Furthermore, there is an emphasis on promoting a culture of critical engagement with Gen-AI in education, focusing on enhancing inclusion, equity, quality of learning, education management, and pedagogy. These findings underscore the importance of a comprehensive approach to Gen-AI integration in education, balancing technological advancements with ethical considerations, inclusivity, and the promotion of lifelong learning opportunities for all.

UNESCO Guidance for Generative Gen-AI in Education and Research

Table 13 explains the UNESCO recommendations for the implementation of Generative Gen-AI in education and research, presenting strategic directions for school leaders supported by illustrative quotes.

Table 13. UNESCO Guidance for Generative Gen-AI in Education and Research

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs must understand and embrace the potential of generative Gen-AI (GenAI) in education, recognizing its capabilities in prompt-engineering and content generation. They should adapt their educational structures to integrate GenAI effectively, enhancing teaching and learning processes. Leaders should adapt their educational strategies to align with UNESCO's guidance on the use of generative Gen-AI (GenAI) in education. This includes developing a policy framework to regulate the use of GenAI and ensuring its integration enhances education and research.	"Towards a policy framework for the use of generative Gen-AI in education and research... Develop Gen-AI competencies including GenAI-related skills for learners" (Section 4). "What is generative Gen-AI and how does it work? ... Prompt-engineering to generate desired outputs... Emerging EdGPT and its implications" .
HRF	SLs must address digital poverty and adapting to rapid technological changes are key concerns. Leaders need to ensure equitable access to GenAI tools and foster a deep understanding of these technologies among educators and students. School leaders must focus on building the capacity of teachers and researchers to make proper use of GenAI is essential. Leaders must ensure that educators are equipped with the necessary skills and competencies to adapt to the evolving educational landscape shaped by GenAI.	"Build capacity for teachers and researchers to make proper use of GenAI" (Section 4). "Worsening digital poverty... Outpacing national regulation adaptation... Use of content without consent...".
PF	SLs must navigate the regulatory aspects of GenAI is crucial. Leaders should be involved in developing and implementing policies that promote inclusive and equitable use of GenAI in education, ensuring that these tools are used responsibly. School leaders must navigate the uncharted ethical issues and copyright considerations in GenAI use is crucial. School leaders should be aware of these aspects and incorporate them into their decision-making processes.	"Uncharted ethical issues... Copyright and intellectual property" (Section 6). "Regulations on GenAI: Key elements... Promote inclusion equity linguistic and cultural diversity... Protect human agency...".
SF	SLs must foster a culture that supports responsible and creative use of GenAI in education is essential. Leaders should encourage diverse and critical thinking, rethinking traditional assessment and learning outcomes to accommodate the impact of GenAI. Leaders should promote an inclusive and equitable quality of education as outlined in UNESCO's global education agenda. This includes focusing on gender equality and ensuring GenAI tools support diverse and creative outputs.	"Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (Global Education 2030 Agenda). "Institutional strategies to facilitate responsible and creative use of GenAI... Homogenized responses versus diverse and creative outputs... Rethinking assessment and learning outcomes...".

The "UNESCO Guidance for Generative Gen-AI in Education and Research" emphasizes the need for school leaders to embrace generative Gen-AI (GenAI), adapt educational structures for its integration, ensure equitable access, and build educator and student capacity for its effective use. This includes developing a policy framework for GenAI regulation, addressing digital poverty, fostering understanding of GenAI technologies, and navigating regulatory, ethical, and copyright issues related to GenAI. Additionally, leaders are encouraged to foster a culture that supports responsible and creative GenAI use, promoting diverse and critical thinking, gender equality, and aligning with UNESCO's global education agenda. These findings highlight a multi-faceted approach to integrating GenAI in education, focusing on both the technological and human aspects, ensuring responsible, equitable, and creative use of these advanced tools in the educational landscape.

UNESCO Recommendation on the Ethics of Gen-AI

Table 14 explains the educational strategies for ethical Gen-AI implementation as recommended by UNESCO, aligning with core principles such as human rights and transparency, and supported by evidence.

Table 14. UNESCO Recommendation on the Ethics of Gen-AI

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should structure educational policies and practices to align with UNESCO's ethical guidelines on Gen-AI. This includes integrating principles such as human rights, fairness, and transparency into Gen-AI usage in educational settings. Leaders must adapt educational structures to align with UNESCO's ethical guidelines on Gen-AI. They should integrate principles of human rights, fairness, and transparency into Gen-AI usage in educational settings, considering the rapid development of Gen-AI and its potential to reshape educational practices.	The Recommendation emphasizes a human-rights-centered approach to Gen-AI, including principles of fairness, transparency, and the promotion of human rights and fundamental freedoms. (Section 2). "The rapid rise in artificial intelligence (Gen-AI) has created many opportunities globally... However these rapid changes also raise profound ethical concerns." and "This framework was adopted by all 193 Member States in November 2021."
HRF	SLs must ensure that teachers and staff are trained in Gen-AI ethics. This involves creating educational programs that embed ethical considerations in Gen-AI use. School leaders should focus on ensuring that educational practices respect, protect, and promote human rights, fundamental freedoms, and human dignity. This involves creating educational programs that embed ethical considerations in Gen-AI use.	UNESCO stresses the importance of ethical governance in Gen-AI, necessitating training and awareness in Gen-AI ethics among educators. (Section 2). "Central to the Recommendation are four core values which lay the foundations for Gen-AI systems that work for the good of humanity individuals societies and the environment: RESPECT PROTECTION AND PROMOTION OF HUMAN RIGHTS AND FUNDAMENTAL FREEDOMS AND HUMAN DIGNITY."
PF	SLs should engage with policy frameworks and ensure that their institutions comply with international and national Gen-AI ethics standards. Leaders must engage in global and local efforts to ensure that Gen-AI in education is governed ethically. They should contribute to policy discussions on Gen-AI and education and implement UNESCO's recommendations in their educational institutions.	The Recommendation calls for establishing necessary legal frameworks to govern Gen-AI technologies, ensuring their contribution to public good. (Section 2). Ten core principles lay out a human-rights centred approach to the Ethics of Gen-AI." and "UNESCO is now focused on implementing the Recommendation..."
SF	SLs should foster an environment where Gen-AI is used responsibly, respecting human dignity and rights. Promoting a culture of ethical Gen-AI usage within educational institutions is essential. Leaders should foster an environment where Gen-AI is used responsibly, respecting human dignity and rights, and contributing to peaceful, just, and interconnected societies.	The document highlights the need for awareness and literacy in Gen-AI, emphasizing the promotion of ethical Gen-AI use in education. (Section 3). "LIVING IN PEACEFUL JUST AND INTERCONNECTED SOCIETIES"

The "UNESCO Recommendation on the Ethics of Gen-AI" emphasizes the need for school leaders to align educational policies and practices with ethical guidelines, focusing on human rights, fairness, transparency, and ensuring teachers and staff are trained in Gen-AI ethics. This includes integrating ethical considerations in Gen-AI use, navigating the political and ethical landscape of Gen-AI in education, engaging with policy frameworks, and complying with international and national Gen-AI ethics standards. Additionally, leaders are encouraged to foster a culture of Gen-AI literacy and ethical Gen-AI usage within educational institutions, emphasizing responsibility, human dignity, and contributing to peaceful, just, and interconnected societies. These findings highlight the critical role of ethical considerations in the integration of Gen-AI in education, underscoring the importance of aligning technological advancements with fundamental human values and rights.

UNESCO Guidelines for ICT in education policies and masterplans

Table 15 explains the UNESCO Guidelines for integrating ICT in education policies and masterplans, detailing the roles of school leaders and providing corroborative quotes.

Table 15. UNESCO Guidelines for ICT in education policies and masterplans

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should adapt to new frameworks that inegrate ICT for effective policy implementation. School leaders need to adapt to a more flexible and inclusive education model, rethinking traditional classroom settings, and embracing a more interconnected learning environment that extends beyond the school to homes and society-wide networks. School leaders need to adapt and innovate in curriculum design and assessment methods, aligning with new structural norms in education.	Here we propose a system-wide framework for the development of ICT in education policies and masterplans. It focuses on the main constituent components for policy planning... The hidden dimensions include... the openness of the curriculum assessment and learning spaces; inclusion and equity in accessing technology; and evaluation of the ethical concerns and risks of using technology across spaces.". The open learning spaces as the entry point to expand access to educational opportunities: Learning spaces represent the entry points for the use of ICT to strengthen and multiply opportunities for education... An approach that transforms the schooling models and enables ubiquitous access to education programmes from schools, homes, or other spaces.".
HRF	SLs should be tasked with ensuring that teacher-training institutions are adequately equipped for ICT usage and promoting a culture that supports staff development in this area. This requires leaders to facilitate the professional development of teachers, especially in learner-centered pedagogical practices that integrate technology, thereby addressing the challenges and opportunities presented by new teaching and learning configurations. It stresses the need for continuous professional development in ICT for teachers, which is a key responsibility for school leaders in managing and developing their staff.	"Successful integration of ICT into teaching and learning requires rethinking the role of teachers and reforming their preparation and professional development... We also commit to providing teachers with system-wide support for the pedagogical use of ICT to incentivize teacher innovation and to develop networks and platforms that allow teachers to share experiences and approaches that may be of use to peers and other stakeholders.".
PF	SLs should navigate a complex landscape of stakeholders, including governmental agencies, civil society, and other partners, to effectively implement ICT policies. School leaders must manage these relationships and ensure that policy implementations are in line with the broader educational goals and the needs of various stakeholders, including students and teachers.	"The masterplan details the activities for each of the building blocks while implementation will employ a balance of top-down and bottom-up methods which involve the key partners and stakeholders to achieve specific objectives measured through KPIs. These processes all require an organizational structure for governing concerted actions and coordinating the implementation across sectors.".
SF	SLs play a pivotal role in shaping the narrative around ICT in education, promoting a culture that values technological advancement while being cognizant of its ethical implications. They must champion a vision that aligns with educational values, ensuring that the integration of technology enhances learning while fostering inclusion, equity, and ethical use.	"The learning and human development outcomes as the aim of the policy: These outcomes represent the goals of the use of ICT in education and the starting point for the policy planning. The inclusion of human values in the outcomes reiterates the humanistic principle underpinning this planning and necessitates a result-based methodology. Well-being and social development must be included alongside the academic learning outcomes.".

The "UNESCO Guidelines for ICT in Education Policies and Masterplans" stress the importance for school leaders to adapt to new frameworks integrating ICT, ensuring teacher-training institutions are well-equipped for ICT usage, and navigating complex stakeholder landscapes for effective policy implementation. This includes innovating in curriculum design and assessment methods, facilitating professional development in ICT for teachers, and ensuring that the integration of technology aligns with broader educational goals and values. Additionally, leaders are tasked with promoting a culture that values technological advancement while being mindful of its ethical implications, fostering inclusion, equity, and ethical use in the process. These findings underscore the multifaceted role of school leaders in the era of ICT, highlighting the need for strategic adaptation, continuous professional development, and ethical consideration in integrating technology in education.

European Union Gen-AI and Education

Table 16 explains the pedagogical implications and strategic considerations for the use of Gen-AI in education as guided by European Union standards, highlighting the need for a human-centric approach, as evidenced by related quotes.

Table 16. European Union Gen-AI and Education

	Implications for SL	Supporting Quotations & Evidence from Document
SF	SLs should critically assess the pedagogical approaches of Gen-AI tools being used in education. Many current Gen-AI tools in education adopt a behaviorist approach, focusing on spoon-feeding pre-specified content, which undermines learner agency and deep learning. Leaders should advocate for Gen-AI tools that support innovative teaching methods rather than replicating outdated practices. School leaders must critically evaluate whether Gen-AI technologies in education are addressing the right educational tasks. They should assess if these technologies enhance learning as a human and social activity and whether they are designed to support or replace teachers. This involves a strategic approach to integrating Gen-AI in a manner that complements and enhances the educational infrastructure and pedagogical practices.	"Almost every existing commercial Gen-AI tool designed to support learners effectively embodies a naïve approach to teaching and learning... This behaviourist approach especially the spoon-feeding prioritises remembering over thinking and knowing facts over critical engagement thus undermining learner agency and robust learning"Are the Gen-AI technologies being introduced in schools and other educational settings addressing the right educational tasks? Are they enhancing learning as an essentially human and social activity, or aiming to make learning 'more efficient'? Are they designed to support, or to replace, teachers?"
HRF	SLs should ensure that education in Gen-AI includes a balanced focus on both its technological and human dimensions. This includes understanding the impact of Gen-AI on human rights, autonomy, and ethics, alongside its technical capabilities. School leaders should focus on the human dimension of Gen-AI in education, ensuring that Gen-AI teachings cover issues like the impact of Gen-AI on human rights, autonomy, and agency. This also encompasses providing professional development for teachers and administrators to make informed decisions about the use of Gen-AI tools in classrooms.	How do we ensure that we move beyond focusing exclusively on the technological dimension of Gen-AI to instead give equal attention to the human dimension of Gen-AI – issues such as the impact of Gen-AI on human rights autonomy and agency alongside questions of transparency fairness trustworthiness and ethics". How do we ensure that we move beyond focusing exclusively on the technological dimension of Gen-AI to instead give equal attention to the human dimension of Gen-AI – issues such as the impact of Gen-AI on human rights, autonomy and agency, alongside questions of transparency, fairness, trustworthiness and ethics." "There is also a critical need for appropriate professional development for teachers (as well as for administrators and policy makers) so that they are able to make informed decisions about which Gen-AI tools might be appropriate for their classroom."
PF	SLs should advocate for robust regulation that addresses human and child rights before implementing Gen-AI tools in classrooms, ensuring ethical standards are met. Leaders must recognize the political dimensions of Gen-AI in education, understanding that curriculum creation and teaching methods are inherently political decisions. They should be aware of the potential for Gen-AI to shift educational priorities towards utilitarian and economically driven goals, rather than learner-centered values.	"We need more evidence... and less hyperbole about the connections between Gen-AI and education... We need appropriate robust regulation addressing human and child rights before Gen-AI tools are introduced into classrooms""It is thus not possible to assess or manage societal impacts by examining a technology divorced from its economic, political, and social context... creating a curriculum or determining how learning should happen are political acts."
SF	SLs should collaborate with multiple stakeholders, including policymakers, educators, Gen-AI researchers, and parents, to ensure that Gen-AI is applied ethically and effectively in educational contexts. School leaders should be aware of the cultural and symbolic implications of integrating Gen-AI into education, especially regarding how it affects the perception of learning, teaching, and educational values.	The ethics of Gen-AI and education is complex but under-researched and without oversight or regulation... multi-stakeholder co-operation with Council of Europe oversight remains key to ensuring that ethical guidelines are applied to Gen-AI in education"

The "European Union Gen-AI and Education" report emphasizes the need for school leaders to critically assess Gen-AI tools in education, focusing on pedagogical approaches that enhance rather than undermine deep learning, and evaluating Gen-AI's role in supporting or replacing teachers. Leaders should ensure Gen-AI education balances its technological aspects with its impact on human rights, autonomy, and ethics, while providing professional development for teachers to make informed Gen-AI tool choices. Additionally, there is a call for robust regulation addressing human and child rights in Gen-AI implementation, and for leaders to be

mindful of Gen-AI's potential shift in educational priorities towards utilitarian goals. These findings highlight the importance of a thoughtful, human-centered approach in integrating Gen-AI in education, ensuring that technological advancements align with ethical standards and enhance the educational experience.

Bolman and Deal's Four Frame Theoryfor Gen-AI Integration into Education

Table 17 explains the multiple dimensions of Gen-AI integration in education through Bolman and Deal's Four Frameworks, presenting a comprehensive approach to structural adaptation, human resources, organizational politics, and cultural symbolism.

Table 17. Bolman and Deal's Four Frameworks for Gen-AI Integration into Education

Structural Framework	Human Resources Framework	Politics Framework	Symbols Framework
adaptation to Gen-AI	Gen-AI staff training	navigate politics	shaping Gen-AI narrative
leadership evolution	enhance Gen-AI competencies	strategy negotiation	cultural perception shaping
socio-economic adaptation	prioritize Gen-AI education	planning & navigation	ethical Gen-AI focus
Gen-AI integration emphasis	address Gen-AI challenges	collaborate with stakeholders	human-centered approach
R&D infrastructure strengthening	adapt HR strategies	educator-centered Gen-AI	ethical Gen-AI education
vision-aligned Gen-AI integration	access to resources	understand Gen-AI impact	foster ethical Gen-AI
thoughtful Gen-AI approach	train in generative Gen-AI	create Gen-AI framework	responsible Gen-AI use
Gen-AI recognition	focus on Gen-AI ethics	align Gen-AI standards	promote critical engagement
leveraging Gen-AI capabilities	address Gen-AI challenges	address Gen-AI concerns	Gen-AI curriculum integration
effective Gen-AI incorporation	recruit science educators	balance opinions	societal impact focus
Gen-AI accessibility	UNESCO Gen-AI skills development	balance education	UNESCO critical engagement
strategy-government alignment	address digital poverty	engage in policy	UNESCO genAI use
understanding Gen-AI complexity	ethical governance importance	navigate regulations	promote Gen-AI literacy
embracing Gen-AI potential	equip teacher training	engage ethical governance	shaping ICT narratives
ethics and Gen-AI alignment	EU balanced approach	advocate Gen-AI regulation	collaboration for ethical Gen-AI

Table 17 presents a consolidated view of four different frameworks relevant to the integration of Artificial Intelligence (Gen-AI) in education. The Structural Framework focuses on adapting educational systems to Gen-AI, evolving leadership roles, enhancing Gen-AI research and development, and ensuring Gen-AI aligns with educational visions and national policies. The Human Resources Framework addresses the development of Gen-AI competencies in staff, prioritizing Gen-AI education and professional development, and adapting human resources strategies to meet the demands of Gen-AI in education. The Organizational Politics Framework deals with navigating the political landscape of Gen-AI in education, including strategy negotiation with stakeholders, alignment with standards, and addressing the regulatory and ethical challenges Gen-AI presents. The Cultural Symbols Framework emphasizes the importance of shaping the cultural narrative around Gen-AI, focusing on ethical integration, fostering a culture of trust, and promoting critical engagement with Gen-AI in educational settings. Each framework outlines the need for strategic approaches to Gen-AI integration, prioritizing ethical considerations, stakeholder collaboration, and the balancing of technological advancements with human-centric values.

DISCUSSION & CONCLUSION

This study has sought to investigate and articulate the multifaceted implications of integrating artificial intelligence (Gen-AI) into education with a specific focus on the roles and responsibilities of school leaders by employing Bolman and Deal's Four Frame Theory. Our results reveal areas of agreement and divergence within the structural, human resources, political, and cultural frameworks, offering a nuanced understanding of the implications for school leadership.Consistent with our findings, Fullan et al. (2023) underscore the need for educational structures to evolve in response to Gen-AI integration. This includes the adaptation of leadership roles to effectively oversee Gen-AI-driven processes and systems, aligning closely with our observation of the necessity for a strategic and inclusive approach to integrating GenAI. Our findings align with Sornberger (2023) and García-Peñalvo (2023), highlighting the importance of aligning educational strategies with government commitments and national policies on Gen-AI integration. This concurrence stresses the need for educational institutions to adapt their structures to incorporate Gen-AI, mirroring our emphasis on aligning educational structures with national Gen-AI strategy priorities. While we emphasize the strengthening of Gen-AI research and development infrastructure in schools, previous research like Tyson & Sauers (2021) focuses more on the behavioral and strategic aspects of Gen-AI adoption, without explicit emphasis on infrastructural readiness. This suggests a gap in the literature regarding the concrete structural adjustments required for effective Gen-AI integration in education.

Both our research and the works of Fullan et al. (2023) and Sornberger (2023) recognize the crucial role of school leaders in enhancing teacher Gen-AI competencies and prioritizing professional development in Gen-AI. This consensus underlines the importance of preparing educators for Gen-AI-driven educational environments, focusing on Gen-AI expertise and ethical use. Our findings resonate with the emphasis on ethical Gen-AI use in education, as discussed by Holmes, Bialik, and Fadel (2019), who advocate for responsible Gen-AI practices. This agreement highlights the shared understanding of the need to address ethical considerations, such as academic misconduct and over-reliance on Gen-AI tools, through targeted professional development. While we focus on training educators specifically in Gen-AI skills and literacy, some previous studies (e.g., Ouyang and Jiao, 2021) suggest a broader approach, integrating Gen-AI education into a wider curriculum. This discrepancy points to varying perspectives on how best to equip educators for the Gen-AI-enhanced educational landscape.

Our findings align with those of Jauhiainen & Guerra (2023) and Chiu (2023), highlighting the importance of navigating Gen-AI-related political implications, such as stakeholder management and resource allocation. This agreement underscores the complex political landscape that school leaders must navigate the integration of Gen-AI into education. Similar to previous research, we recognize the need for school leaders to collaborate with stakeholders in Gen-AI development and training, emphasizing the importance of engaging in policy discussions to address Gen-AI-related inequalities and socio-political instability. Our findings suggest the need for a balanced approach to Gen-AI education that considers decentralized access to quality Gen-AI education. However, previous studies do not explicitly address the challenges and opportunities presented by a decentralized Gen-AI education system, indicating a potential area for further exploration.

Consistent with previous research, we highlight the responsibility of school leaders in shaping the narrative around Gen-AI in education and promoting its ethical integration. This reflects a shared understanding of the importance of aligning Gen-AI integration with existing values and ethical standards, as also emphasized by UNESCO and other studies. Our findings and those of previous studies (e.g., Mustafa, 2023) agree on the necessity of fostering a culture of critical engagement with Gen-AI. This includes educating about Gen-AI's ethical implications and ensuring its responsible application in education. While we advocate for a human-centered approach to Gen-AI, emphasizing human judgment in Gen-AI applications, some previous studies focus more on the technological and efficiency aspects of Gen-AI integration. This divergence highlights differing priorities in the discourse on Gen-AI in education, between emphasizing human values and the push for technological advancement.

In summary, our analysis through Bolman and Deal's Four Frame Theory reveals both convergences and divergences with previous research on integrating GenAI in education. These insights underscore the complexity of Gen-AI integration and the multifaceted role of school leadership in navigating these changes. While there is significant agreement on the need for structural adaptation, professional development, ethical Gen-AI use, and stakeholder collaboration, divergences point to areas requiring further exploration, such as infrastructural readiness, the approach to Gen-AI education, the impact of a decentralized Gen-AI education system, and balancing technological advancements with human-centered values.

In the field of education, the "Structural Framework" across various national strategies and UNESCO guidelines underscore a universal need for school leaders to adapt and innovate in the face of Gen-AI's transformative potential. Central to these adaptations is the alignment of educational structures with national Gen-AI priorities, emphasizing the integration of Gen-AI in ways that enhance and complement existing teaching and learning systems. This requires a strategic overhaul in various aspects: from curriculum design, teaching methodologies, to assessment processes, ensuring Gen-AI tools are effectively incorporated and aligned with broader educational visions. Furthermore, an ethical dimension is highlighted, urging leaders to integrate Gen-AI in adherence to principles like human rights, fairness, and transparency. Across the board, the emphasis is on adapting educational structures to not just accommodate but also leverage Gen-AI's capabilities, ensuring that Gen-AI integration is thoughtful, inclusive, and enhances the overall educational experience for all students.

In conclusion, the "Human Resources Framework" across various national and international strategies emphasizes the pivotal role of school leaders in preparing educators for an Gen-AI-integrated educational landscape. This preparation involves not only developing Gen-AI competencies and technical skills but also encompasses a broader understanding of Gen-AI's ethical implications, its impact on human rights, and the importance of inclusive and equitable education. School leaders are tasked with navigating challenges such as academic misconduct, over-reliance on Gen-AI tools, and the need for continuous professional development in both Gen-AI and ICT. The focus extends to ensuring equitable access to Gen-AI resources, addressing digital poverty, and adapting to rapid technological changes. Moreover, the frameworks highlight the need for a balanced focus on both the technological and human dimensions of Gen-AI in education, ensuring that educators are equipped to leverage Gen-AI effectively and responsibly, while also critically assessing and addressing its limitations and potential biases.

The "Political Framework" across various national and international contexts underscores the essential role of school leaders in navigating the complex political landscape shaped by the integration of Artificial Intelligence (Gen-AI) in education. This framework consistently emphasizes the need for leaders to manage stakeholder relationships, align Gen-AI strategies with national and international standards, and address ethical considerations. School leaders are tasked with balancing technological advancement and educational integrity, ensuring Gen-AI supports educators without replacing them. Furthermore, they must be proactive in understanding and mitigating the potential impacts of Gen-AI on curriculum and learning outcomes. The framework also highlights the importance of leaders being involved in policy discussions, addressing inequalities, and advocating for regulations that prioritize human and child rights. In essence, the integration of Gen-AI in education is not merely a technological or pedagogical challenge but a deeply political one, requiring astute leadership and comprehensive planning to harness its benefits while navigating its complexities.

The "Symbolic Framework" across various international strategies emphasizes the pivotal role of school leaders in shaping the narrative and culture surrounding Gen-AI in education. These leaders are tasked with integrating Gen-AI in a manner that is ethically aligned with existing educational values and international standards. A common thread in these strategies is the promotion of ethical Gen-AI use, emphasizing the importance of human judgment, digital citizenship, and an understanding of Gen-AI's societal implications. The frameworks underscore the need for a balance between embracing technological advancement and maintaining critical engagement with Gen-AI, ensuring its responsible use while fostering a culture that acknowledges both its opportunities and limitations. This includes a focus on inclusion, equity, and the enhancement of learning and teaching processes. School leaders are encouraged to collaborate with various stakeholders to ensure that Gen-AI's integration into education not only respects human dignity and rights but also contributes to the development of a literate, ethical, and socially aware Gen-AI society.

Limitations And Recommendations for Future Research

The study acknowledges that document analysis may be limited by the availability and accessibility of relevant documents. Additionally, the interpretation of the documents may be influenced by the researcher's perspectives and biases, although efforts were made to mitigate this through methodical analysis and peer review. In conclusion, the methodology of this study is designed to provide an in-depth and nuanced understanding of how the integration of Gen-AI in education is addressed in international policy documents, and what implications this has for school leadership, analyzed through the theoretical lens of Bolman and Deal's Four Frame Theory.

School leaders should prioritize building a robust infrastructure that supports Gen-AI technologies, ensuring that the Gen-AI integration aligns with the strategic vision and educational goals of their institution. Leaders must focus on continuous Gen-AI-related professional development, equipping educators with the

necessary skills to adapt to and integrate Gen-AI into their teaching practices. It is crucial for leaders to cultivate a collaborative environment where Gen-AI integration is discussed transparently, engaging all stakeholders in decision-making processes to align Gen-AI initiatives with broader educational objectives. To foster a positive narrative around Gen-AI, school leaders should promote a culture that values ethical Gen-AI use and integrates Gen-AI literacy across the curriculum, thereby shaping the institution's identity around innovation and responsible Gen-AI adoption.

While the strategies across different countries recognize the need for structural adaptation in education to integrate Gen-AI, there is a notable gap in the consistent and comprehensive integration of ethical considerations. This includes aspects like data privacy, bias in Gen-AI algorithms, and the impact of Gen-AI on student behavior and learning outcomes. The current frameworks, although progressively adapting to technological changes, may not fully address these ethical challenges. Many of the strategies focus heavily on the technological aspects of Gen-AI integration, such as updating curriculum and enhancing teaching methodologies with Gen-AI tools. This technology-centric approach may overlook the human-centric aspects of education, like fostering critical thinking, creativity, and social-emotional learning in students. There is a risk that the emphasis on Gen-AI could lead to a reductionist view of education, where the richness of human interaction and traditional pedagogical methods are undervalued.

It is crucial to investigate developing robust ethical frameworks that guide the integration of Gen-AI in education. This includes studying the impact of Gen-AI on student privacy, understanding potential biases in Gen-AI algorithms, and ensuring Gen-AI applications in education align with broader societal values. Research could explore how to balance the use of Gen-AI tools while safeguarding student rights and promoting equitable learning environments. It is essential to conduct research on finding the right balance between utilizing Gen-AI tools and maintaining the human essence of teaching and learning. This involves investigating how Gen-AI can complement rather than replace traditional teaching methods, and how it can support rather than undermine critical thinking and creativity in students. Research should also explore how to prepare educators for this new paradigm, focusing on training and professional development to effectively integrate Gen-AI in their teaching while preserving the core values of education.

A significant limitation observed across various frameworks is the disparity in access to necessary resources for Gen-AI education, such as data, computing resources, and specialized training programs. This disparity, often influenced by geographical and socio-economic factors, can hinder the effective implementation of Gen-AI education strategies and exacerbate digital poverty. Many frameworks emphasize the importance of integrating both the technological and ethical dimensions of Gen-AI in education. However, there exists a challenge in effectively balancing these aspects. The focus tends to lean more towards technological proficiency, often at the expense of adequately addressing ethical, human rights, and autonomy concerns associated with Gen-AI.

Future writing should explore and propose concrete strategies for equitable distribution of Gen-AI educational resources. This includes developing models for resource sharing, partnerships between advantaged and disadvantaged regions, and targeted investment in under-resourced areas to ensure a more uniform standard of Gen-AI education and training. There is a need for a more integrated approach that equally emphasizes both the technological capabilities and the ethical, societal, and human rights aspects of Gen-AI. Future frameworks should include guidelines on how to effectively embed ethical considerations into the Gen-AI curriculum and ensure that these aspects are not overshadowed by the technical components of Gen-AI education.

The current "Organizational Politics Framework" predominantly emphasizes global standards and international collaborations in Gen-AI implementation. This approach may overlook the unique local and cultural contexts in different educational systems. For instance, the specific needs, resources, and challenges of schools in various regions could significantly impact the effective integration and governance of Gen-AI in education. The framework's general approach might not adequately address these local differences, leading to potential gaps in policy and implementation effectiveness. While the framework highlights the need for stakeholder engagement and policy navigation, it lacks specific guidelines on how school leaders can effectively engage with these stakeholders and implement Gen-AI strategies. The complex nature of Gen-AI technology and the varying levels of Gen-AI literacy among educators, parents, and policymakers can pose significant challenges. The framework's current form may not provide sufficient practical guidance for school leaders to bridge these gaps, leading to potential misunderstandings or misalignments in Gen-AI integration goals and processes.

Future research should focus on developing Gen-AI integration models that are tailored to specific local contexts. This would involve in-depth studies of different educational environments, identifying unique challenges and resources, and customizing Gen-AI strategies accordingly. Such research could provide more practical and

context-sensitive guidance to school leaders, ensuring that Gen-AI integration is more effectively aligned with the specific needs and capabilities of their schools. There is a need for more comprehensive research into practical strategies for Gen-AI integration and stakeholder engagement in the educational sector. Future studies should explore and document best practices, case studies, and implementation models that school leaders can adopt. This research should also focus on developing communication and engagement strategies to effectively bridge the gap between Gen-AI experts, educators, policymakers, and the broader school community, enhancing the collaborative and informed implementation of Gen-AI in education.

The current "Cultural Symbols Framework" heavily emphasizes ethical considerations and responsible use of Gen-AI in education, potentially overshadowing the practical aspects of Gen-AI integration. This focus may limit the exploration of diverse applications of Gen-AI in educational settings, particularly in areas that require more technical understanding and implementation strategies. The framework predominantly provides general principles and guidelines, which may not be sufficiently tailored to address the unique challenges and needs of different educational systems and cultural contexts. This one-size-fits-all approach might not effectively address the specific requirements or barriers faced in various regions or educational institutions.

Future frameworks should include more detailed strategies and examples of practical Gen-AI applications in education. This would provide school leaders with actionable steps and real-world examples, aiding in the effective implementation of Gen-AI technologies in their specific educational contexts. While this study constructs a framework for educational leaders, it acknowledges the limitation of not providing a direct comparative analysis of various countries' Gen-AI policies. Future research, therefore, could benefit from a comparative analysis of Gen-AI integration strategies across different countries, using Bolman and Deal's Four Frame Theoryto highlight distinct approaches and shared themes in educational Gen-AI policy development.

Statements of Publication Ethics

We are committed to upholding the highest standards of publication ethics, ensuring integrity, transparency, and accountability at every stage of the publishing process.

Researchers' Contribution Rate

Authors	Literature review	Method	Data Collection	Data Analysis	Results	Conclusion
Author 1's name	☒	☒	☒	☒	☒	☒
Author2's name	☒	☒	☒	☒	☒	☒

Conflict of Interest

We declare that there are no conflicts of interest associated with this study.

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