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The rise of AI-assisted instructional leadership: empirical survey of generative AI integration in school leadership and management work

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This study examined the rising importance of generative artificial intelligence (GenAI) in school leadership. Research in educational leadership and management must change to keep up with how digital technology continues to influence organisational procedures and human relationships in organisations in the 21st century. The study explores two key questions: (a) at what stage of adopting innovation are school leaders currently in their use of GenAI (innovators, early adopters, early majority, late majority, or laggards) and (b) which domains of their school leadership work (managerial, instructional, social, political, or moral) are most influenced by their use of GenAI? Data were collected through an online survey of 302 Israeli school leaders (coordinators, subject heads, department heads, school counsellors, vice-principals, principals, etc.). A series of descriptive analyses were conducted to examine the research questions. The findings indicate that currently about 50% of the school leaders in the sample are at the early majority stage of adopting GenAI technology, about to cross into the late majority stage. The results also indicate the rise of AI-assisted instructional leadership above all other domains of school leadership work. Additional analyses indicate some patterns of integration and usage relate to seniority and role type. The study expands our understanding of the rapidly growing effect of GenAI in school leadership in general and AI-assisted instructional leadership in particular. These insights contribute to the limited research on GenAI's integration into school leadership by offering some of the missing empirical evidence on the scope and direction of the phenomenon.

KEYWORDS

AI-assisted instructional leadership, artificial intelligence, GenAI, innovation diffusion stage, school leaders, AI-assisted school leadership, AI-assisted school management

Introduction

Artificial intelligence (AI) refers to advanced technology based on natural language processing (NLP) and machine learning algorithms that mimic human thought processes; it is used to design machines that complete human cognitive tasks, including learning automatically from programmed data and information (Aljemely, 2024). Much of the writing on AI and leadership is argumentative, reflecting on near or far-future scenarios in which AI will replace organisational leadership (Quaquebeke and Gerpott, 2023) or act in symbiosis with it (Wang, 2021a, 2021b). Whether these future scenarios will or will not take place, individuals use technology as it suits their work. The wide spread of publicly available GenAI technology that creates new text, picture, and audio material using transformer

architectures and deep machine learning algorithms (e.g., ChatGPT, Copilot, Claude, Gemini, and other AI chatbot tools) (Collie et al., 2024) has begun to change societies. A Glassdoor study of 5,000 US professionals from industries such as marketing, health, insurance, law, etc., from January 2024 reported that 62% have used GenAI in their work, doubling the ratio over the previous year (Glassdoor, 2024). A RAND poll from the fall of 2023 reported that a third of US teachers used AI at least once in their work (RAND, 2024). Yet, current empirical knowledge on school leaders' use of AI is largely missing- for a notable exception, see Tyson and Sauers (2021), which has become obsolete.

Empirical research on teachers indicates that the integration of GenAI in teaching is a revolutionary development that transforms conventional teaching and schooling (Collie et al., 2024), with great potential for changing educational leadership and administration (Arar et al., 2024; Fullan et al., 2024; Wang, 2021a, 2021b). But because empirical evidence is missing, this remains largely a speculation. To fill this gap, the present study explored how school leaders (coordinators, subject heads, department heads, school counsellors, vice-principals, principals, etc.) leveraged GenAI technologies to enhance productivity, creativity, and decision making in leadership and management roles. Based on data collected from 302 Israeli school leaders, the study investigated the following research questions:

1 What is the innovation diffusion stage (innovators, early adopters, early majority, late majority, or laggards) that best describes the current use school leaders make of GenAI?
2 For what activity domains or tasks (managerial, instructional, social, political, or moral) do school leaders currently use GenAI more frequently?

Literature review

Conceptual framework

The study draws on Rogers's (1995) innovation diffusion theory, which explains the gradual spread of novel ideas, products, and practises throughout the population. Rogers identified five categories of innovation adopters in a given population, who can be placed on a temporal spreading timeline of innovation: innovators, early adopters, early majority, late majority, and laggards (see Figure 1). The categories reflect how willingly and quickly individuals adopt innovation. The first to adopt innovation are the innovators, who are frequently daring and willing to try out cutting-edge technology. According to Rogers, this is a small group of about 2.5% of the population. The second-fastest group to accept innovation is that of the early adopters (some 13.5% of the population); these are powerful thought leaders who assist in introducing novel ideas, products, or practises to a wider audience. The third group, known as the early majority, makes up about 34% of the population; they accept innovation more slowly and weigh the experiences of early adopters before embracing a new concept. With the early majority, innovations become part of mainstream society. The fourth group, making up approximately an additional 34% of the population, belongs to the late majority; these are individuals typically resistant to change who embrace innovation only after it has gained widespread acceptance. Last, the group of laggards (16%) are those least adaptable to innovation, who embrace it only when they are required to do so or when more established options are no longer available.

AI and school leadership

Reflecting on the future of leadership, Quaquebeke and Gerpott (2023) suggested that AI will fully take over the task responsibilities (e.g., monitoring workers' job progress, providing task-related guidance, etc.), relationship responsibilities (e.g., encouraging staff members based on their preferences, enhancing positive work relationships, etc.), and change-oriented responsibilities (e.g., creating a compelling vision, inspiring followers, etc.) that we normally identify with human leaders. Compared to general leadership studies, research on educational leadership paid relatively little attention to AI, amounting mostly to reflective works (Fullan et al., 2024; Wang, 2021a). Educational leadership scholars discussed the possibility of AI shaping symbiotic human-AI decision making in school leadership, specifically related to data literacy (Wang, 2021a, 2021b). Fullan et al. (2024) argued that AI and GenAI have the potential to significantly ease the management and administrative responsibilities of school administrators and at the same time to undermine or even completely replace some school leadership roles. Both may be true. Arar et al. (2024) conducted a bibliometric analysis of data from the Scopus database on AI and educational leadership. The researchers reported that no education administration journals were among the top ten publication platforms mentioning educational leadership and AI. Those that did include interdisciplinary journals, psychology journals, educational tech journals, and conference proceedings. One of the few empirical works on AI and school leaders is Tyson and Sauers's (2021) qualitative study of US school leaders' experiences with the adoption and implementation of the ALEKS AI programme (i.e., a learning and assessment system for students). Their study found that workload and perceptions of technology as effective influenced school leaders' adoption of AI in their classrooms. At present, many new questions need exploration (Fullan et al., 2024), for example, whether AI will alter school leadership and why AI matters to school administrators.

Activity domains of school leaders

Scholars have suggested that school management has five interrelated domains of activity: managerial, instructional, social, political, and moral (Berkovich and Bogler, 2020; Greenfield, 1995). The management domain includes technical tasks, such as planning, budgeting, coordination, monitoring, and assessment, which help schools achieve their objectives in education (Greenfield, 1995) and allow teachers and students to concentrate on teaching and learning (Berkovich and Bogler, 2020). The instructional domain includes leadership practises that aim to advance and improve teaching and learning (Berkovich and Bogler, 2020; Greenfield, 1995). The knowledge about instructional activities and responsibilities of school leaders expanded in recent decades (Gumus et al., 2018; Hallinger, 2018). The social domain involves the coordination, oversight, and

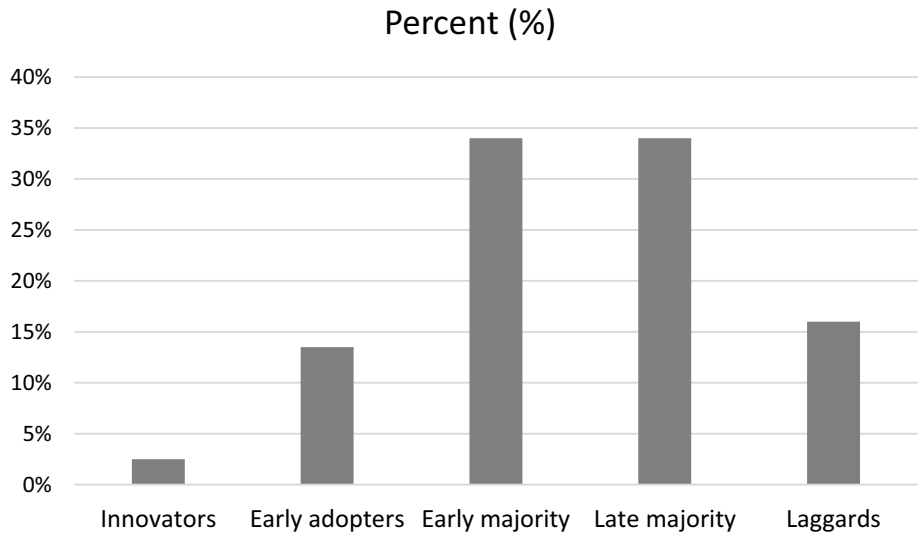

FIGURE 1
Prevalence of innovation groups in society by Rogers (1995).

encouragement of school stakeholders' collaboration and cultivation of interpersonal relations (Berkovich and Bogler, 2020; Greenfield, 1995). This covers the communicative aspects of school leaders' roles (Gronn, 1983). The political domain includes the use of power to influence resource accumulation and allocation and address competing external and internal interests (Berkovich and Bogler, 2020; Greenfield, 1995). Schools must deal with the politics and micropolitics of distributing resources because they operate in an environment where resources (time, money, and staff) are limited (Scribner et al., 1999). The moral domain includes decisions based on values, influencing teachers' moral attitudes and behaviour and shaping ethical and moral climate in schools. School leaders need to weigh divergent and oftentimes opposing 'standards of goodness' and decide what is more right and proper (Berkovich and Bogler, 2020; Greenfield, 1985).

Methods

An institutional review board (IRB) approved the study. An online poll of public school leaders conducted in January 2025 served as the basis for the investigation. I used convenience sampling, which has the advantage of being among the least costly and time-consuming sampling techniques, although the sample may not be representative because of selection bias (Malhotra and Birks, 2006). Inclusion criteria were (a) being a working public school leader in primary or secondary schools and (b) answering all survey questions. Three hundred two school leaders responded to the survey. The gender distribution of participants was 18.9% male and 80.8% female, with 0.3% ($n = 1$) not specified. Teaching experience was distributed as follows: 8.3% had 0–3 years of experience, 16.2% 4–6 years, 24.5% 7–10 years, 18.5% 11–15 years, 18.2% 16–25 years, and 14.2% 26 years or more. The educational levels of schools where participants worked were nearly evenly divided: 50.7% elementary schools and 49.3% secondary schools. Team size was distributed as follows: 24.8% of participants managed fewer than five teachers, 24.5% 6–10 teachers, 13.2% 11–15 teachers, 8.9% 16–20 teachers, 4.3% 21–25 teachers, 5.6% 25–30 teachers, 8.6% 31–50 teachers, and 10.9% managed teams of 51 or more teachers. Table 1 presents the breakdown of the sample by type of school leader role.

TABLE 1 Roles of school leaders in the sample.

School leader role	*n*	Percent (%)
Department head	55	13.8
Subject head	135	33.8
School counsellor	38	9.5
Vice-principal	16	4
Principal	9	2.3
Social activities coordinator	49	12.3
Total (*N*)	302	100

The survey was inspired by the five domains of activity described in the literature, paying special attention to covering a wide range of tasks relevant to various school leadership roles (coordinators, subject heads, department heads, school counsellors, vice-principals, principals, etc.). I formulated 19 items describing these tasks (Table 2). After consulting the literature on GenAI used by teachers (Collie et al., 2024), I provided participants with the following introduction explaining what GenAI means before answering the survey: 'Generative artificial intelligence (AI) refers to advanced technology that uses machine learning to generate new content, such as text, images, music (for instance, ChatGPT, Copilot, Claude, Gemini, Perplexity, and so on)'. I asked participants: 'For which tasks do you currently use GenAI as part of your leadership role at the school?' For each task listed, I asked participants to indicate whether they used AI for the task (1) or not (0).

I used descriptive statistics to analyse the responses to the two research questions. First, for each item in the survey, I calculated the percentage of the sample that reported using it. Second, to explore the comparative usage trends across school leadership activity domains,

TABLE 2 Responses to the questions "For what tasks are you using GenAI in your work as a school leader"?

Rank	Activity	Percent (%)
1	Developing educational programmes (subject-specific, social domains, life skills) for given age groups or the entire school community. (I)	60.3
2	Developing lesson plans or resources for the teaching staff working under the manager. (I)	57.3
3	Planning or organising professional development workshops or training for teachers. (I)	49
4	Creating communication materials for the school staff and the parent community (e.g., newsletters, announcements). (S)	48.7
5	Planning, improving, or drafting observation reports for teacher evaluations. (I)	48
6	Training or encouraging staff to use educational technology tools (e.g., learning management systems). (I)	46
7	Proposing ideas or planning school events, extracurricular activities, and community engagement. (S)	44.7
8	Designing or analysing surveys to assess the atmosphere among teachers and students. (S)	43.4
9	Planning and drafting school policies and procedural guidelines for staff. (MA)	42.7
10	Writing detailed project and initiative requests for the school principal, school ownership, local authorities, and the Ministry of Education. (P)	41.1
11	Analysing student achievement data to identify trends and areas for improvement. (I)	40.4
12	Drafting responses and reports for the school principal, school ownership, local authorities, and the Ministry of Education. (P)	40.1
13	Formulating criteria for evaluating the performance of the teaching staff and the school. (MA)	39.4
14	Preparing schedules for the team working under the manager and for school events. (MA)	39.1
15	Drafting ethical guidelines and assisting in decision-making on ethical dilemmas where the correct and appropriate course of action is unclear. (MO)	38.4
16	Finding solutions for effective mentoring of staff members. (MA)	37.7
17	Planning conversations with parents (e.g., for conflict resolution) and subordinates (e.g., preparing for group discussions and feedback sessions). (S)	35.1
18	Identifying and addressing issues related to diversity, equity, and inclusion (discussions, content planning, problem identification, etc.). (MO)	34.1
19	Assisting in budget planning and resource allocation. (MA)	25.8

MA, managerial; I, instructional; S, social; P, political; MO, moral.

I categorised the AI-related tasks by domain, calculated the domain means, and presented the results graphically.

Findings

To answer research question 1, 'To what GenAI diffusion stage can school leaders be assigned', I calculated the percentage of participants who reported using GenAI in various school leaders' tasks. The findings reveal that GenAI was widely used by school leaders for various purposes (Table 2). Most frequently leaders reported using AI technologies to develop educational programmes for given age groups or the entire school (60.3%), creating lesson plans for teams (57.3%), organising professional development workshops for teachers (49%), designing communication materials for staff and parents (48.7%), and planning, improving, or drafting observation reports for teacher evaluations (48%). Less common applications included budget planning and resource allocation (25.8%), addressing issues of diversity, equity, and inclusion (34.1%), and planning conversations with parents (e.g., for conflict resolution) or subordinates (35.1%). Table 2 shows that according to Rogers's diffusion of innovation classification, GenAI was in the early majority stage (16–50% of the population), with about a quarter of the tasks near or in to late majority group (the 50% threshold).

Exploring the mean use of GenAI in the five domains of activities that school leaders' role demands reveals that AI has become an integral part of all domains of activities. In Figure 2, a higher score reflects greater integration within a given domain, representing a greater proportion of the tasks in which AI is being used. The figure shows that AI-assisted instructional domain leads the other domains. This suggests that the instructional leadership aspect of school leaders' roles is currently undergoing the greatest transformation owing to the integration of AI as a supporting technology.

I conducted additional analyses concerning the effects of teaching experience and role type. I used an independent samples t-test to determine whether there was a significant difference in the uses of GenAI between novice teachers (0–6 years of experience, $n = 74$) and experienced ones (16 years of experience or more, $n = 98$). The results showed that novice teachers differed significantly in the degree of AI integration from experienced teachers in the managerial task domain ($M = 0.46$, $SD = 0.37$ vs. $M = 0.31$, $SD = 0.33$; $t(170) = 2.76$, $p = 0.006$) and marginally significantly from experienced teachers in the political task domain ($M = 0.48$, $SD = 0.43$ vs. $M = 0.35$, $SD = 0.43$; $t(170) = 1.94$, $p = 0.053$). Thus, novice teachers integrated GenAI use more in these two task domains. A one-way analysis of variance (ANOVA) was conducted to evaluate differences across the four largest role groups in the sample (social coordinators, department heads, subject heads, and school counsellors) in the five domains of activity. The results of the ANOVA revealed no significant differences across the four groups for most domains, except for the social domain, where the results approached significance: $F(3, 273) = 2.31$, $p = 0.076$. *Post hoc* comparisons using Tukey's HSD did not indicate statistically significant group differences. Comparing the two largest role groups in the sample, department heads ($n = 55$) and subject heads ($n = 153$), using the independent samples t-test, indicated a significant difference only in the degree of AI integration in the social task domain (department heads: $M = 0.51$, $SD = 0.33$ vs. subject heads: $M = 0.39$, $SD = 0.35$; $t(188) = 2.15$, $p = 0.032$). These findings

suggest a different level of AI integration within this social domain of tasks by different types of school leadership roles. Table 3 summarises the significant independent samples t-test results on the use of GenAI between subgroups.

Discussion

The use of GenAI in schools has been a ground-breaking development that is revolutionising traditional education. Yet, to date, research attention on this phenomenon has been limited despite the considerable scope of teacher research (Collie et al., 2024). Claims that the GenAI revolution has the potential to significantly affect educational administration and leadership remained mostly hypothetical (Arar et al., 2024; Fullan et al., 2024; Wang, 2021a, 2021b) because of the lack of empirical exploration. The present innovative study contributes to understanding the propagation of GenAI in school administration and the work domains in which school leaders now use it most. Whilst the futuristic scenario of AI and leadership (Quaquebeke and Gerpott, 2023; Wang, 2021a, 2021b) remains speculative for now, one cannot ignore its deep integration as an assistive technology across all functions of school leadership.

First, according to Rogers' diffusion of innovation theory (1995), in school leadership roles, GenAI appears to have progressed beyond early adopters to the early majority stage. The findings of the study also indicate that GenAI has now become a widespread technology used by mainstream individuals in the school leadership and is on the brink of reaching the late majority group. This contrasts sharply with early reports on the use of AI by school leaders just a few years ago (Tyson and Sauers, 2021), which align with what Rogers (1995) referred to as the innovators group. Previous surveys in the adult professional population suggest that the pace of adoption of this technology is extremely high and the rate of users has doubled in in 2024 (Glassdoor, 2024). Therefore, it is reasonable to predict that in 2–3 years, most school leaders will use GenAI to support and assist them in their tasks. Already, the findings indicate that GenAI is significantly changing educational leadership and administration. Currently, the situation is far from utopian (or dystopian) scenarios of AI fully taking over the task-, relationship-, and change-oriented responsibilities of leaders (Quaquebeke and Gerpott, 2023), or promoting symbiotic human-AI decision making by leaders (Wang, 2021a, 2021b) but closer to AI easing the management and administrative responsibilities of school leaders (Fullan et al., 2024). Nevertheless, we know that reliance on assistance from technology in daily tasks can promote technological dependence and even addiction (Laor and Galily, 2022). We also know that the presence of a technological product creates social norms, for example, mobile phones have promoted a social obligation to be always available (Li and Chan, 2024). Thus, school leaders' role partners may begin to expect GenAI-level work (for example, fast and high-quality first draughts), which will create a social norm that becomes internalised. These possibilities can make it more difficult for school leaders to revert to performing role tasks without GenAI technology.

Second, the findings indicate that GenAI technology is currently used more in instructional leadership tasks. This is not surprising, as previously claims suggested that school leaders' main priority was to promote high-quality teaching and learning (Hallinger, 2018) and that instructional leadership emerged in cross-country analyses as an influential model for leaders in many countries (Gumus and Bellibas, 2016; Urick and Bowers, 2019). Thus, applying Rogers theory (1995) to the successful diffusion of innovation in an occupational field requires evaluating the extent to which a given innovation is widely utilised in the core goals and tasks of that occupation. Recent works have already reported that instructional leadership has evolved to a digital model suited to support online teaching (Berkovich, 2023; Berkovich and Hassan, 2024). The current digital transformation is of a different nature. Whereas the first evolution was in the 'what for' of instructional

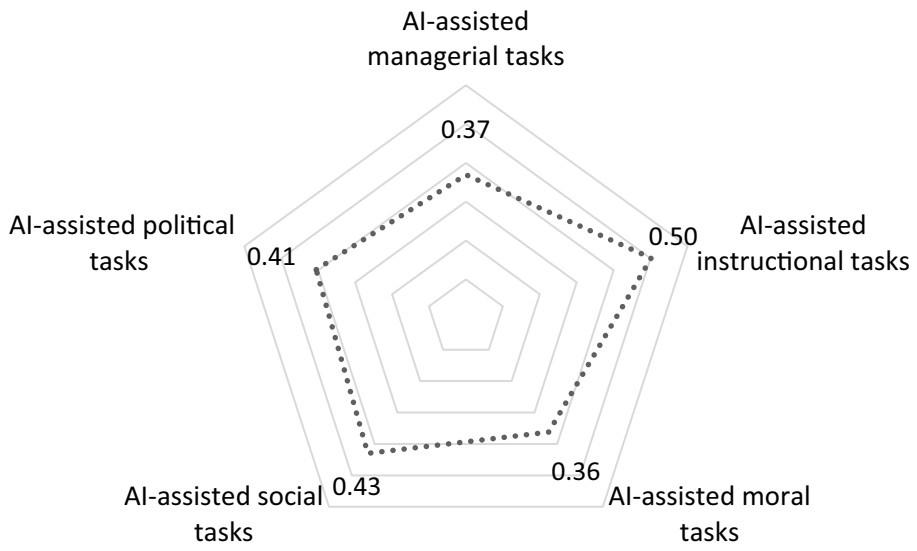

FIGURE 2
Prevalence of AI-assisted tasks of school leaders by domain.

TABLE 3 Significant independent samples *t*-test results on the use of GenAI between subgroups.

GenAI-assisted task domain	Subgroups				*t*-test results
	Novice teachers (*n* = 74)		Experienced teachers (*n* = 98)		*t*(df), *p*
	M	*SD*	M	*SD*	
Managerial task domain	0.46	0.37	0.31	0.33	$t(170) = 2.76$, $p = 0.006$
Political task domain	0.48	0.43	0.35	0.43	$t(170) = 1.94$, $p = 0.053$

	Department heads (*n* = 55)		Subject heads (*n* = 153)		*t*(df), *p*
	M	*SD*	M	*SD*	
Social task domain	0.51	0.33	0.39	0.35	$t(188) = 2.15$, $p = 0.032$

leadership, focusing on adapting leadership practises to the needs of online teaching environments, the current transformation of GenAI-assisted instructional leadership represents a shift in the 'how' of instructional leadership. Tyson and Sauers's (2021) study suggested that school leaders' workload and their perception of technology as effective promote greater integration of AI. Therefore, the current policy environment of test-based accountability (Ro, 2019) may be contributing to this workload and indirectly to the stronger integration of GenAI into instructional school leadership tasks. The picture emerging from this study is that of the wide use of AI-assisted instructional leadership. If this trend continues and GenAI becomes part of instructional tasks even for individuals in the late majority and laggard groups (see Rogers, 1995), AI-assisted instructional leadership will likely become a dominant practise in schools.

Third, the additional analyses indicate that for the managerial and political task domains, GenAI-assisted school leadership is more prevalent in novice teachers—likely an indication of generational differences. This is consistent with existing evidence that teachers from Generation Z were generally more positive about the advantages of GenAI than those of Generations X and Y, who showed concern about its overuse as well as its ethical and pedagogical ramifications (Chan and Lee, 2023). Nevertheless, no significant difference was detected in the other three task domains. This suggests that generational differences are evident in some task domains and not in others, possibly because of generational differences in values, attitudes, and experiences. The additional analyses also reflected the possibility that the type of school leader role was associated with the scope of AI integration in particular task domains. Department heads more actively utilize Gen AI in the social domain than subject heads. This aligns with the prior description of one key function of effective department heads as being focused on building relationships with teachers and parents (Leithwood, 2016). This means we see that key defined role aspects are being re-manifested in new Gen AI use patterns. In this sense, applying Rogers (1995) theory beyond the societal level to occupational and organisational contexts highlights that the pace and scope of innovation diffusion are shaped by the interaction between task domains, professional experience, and role type.

The study's context naturally impacts the outcomes, as it was conducted in Israel. Previous studies in Israel suggest that school leaders do not fully embrace instructional leadership (Shaked et al., 2021); therefore, leaders in other countries may show a greater inclination towards AI-assisted instructional leadership. Additionally, Israel is generally considered a digitally oriented society. The 2024 IMD World Digital Competitiveness Ranking, which measures how well countries adopt and exploit digital technologies to transform government, business, and society, places Israel 16th out of 67 countries (Institute for Management Development, 2024). Moreover, the reported change occurred in an organic, bottom-up manner rather than through a top-down directive. This may be possible because Israel's centralised bureaucracy is considered relatively flexible or "fuzzy," meaning it is not strictly enforced, which allows for local initiatives despite formal structures (Dery, 2002). In contrast, more formal governments and societies may hinder the kind of GenAI innovation described here.

The study offers several practical implications for school leadership in this period of rapid technological change. First, there is a need to incorporate GenAI literacy into school leadership training and professional development programmes. As more than half of the participating school leaders use it, it is clear that this is a widespread practise that calls for more structured guidance. Second, whilst the benefits of GenAI are evident in terms of efficiency, planning, and data use, there are also ethical concerns that cannot be ignored. Issues such as data privacy, algorithmic bias, and the risk of over-reliance on AI suggestions require careful thought (Wang, 2021a, 2021b). School leaders must not only become proficient users of GenAI but also develop a strong professional ethical identity through which they can critically assess their own use of GenAI. Finally, as some patterns of usage appear to vary by teaching experience level or role type, differentiated training may be necessary to ensure school leaders are well prepared to use this innovative technology in their leadership and management work.

The study has several limitations. First, it is an exploratory study on the use of GenAI in different school leadership roles, therefore, caution must be applied when reflecting on the findings with respect to particular roles. Second, the sample was not representative because the study used convenience sampling (Malhotra and Birks, 2006). It is recommended that future studies use random sampling. Third, the study did not assess the full range of school leaders' tasks, their technological maturity, or organisational constraints, therefore it is possible that current usage patterns were affected by these factors, which warrants further research. Fourth, the effective integration of GenAI in school management is likely influenced by leaders' technological capabilities. Thus, future research can examine whether training efforts aimed at improving leaders' technological competencies result in higher and more effective integration of GenAI in school management. Fifth, the study was conducted at a time point

of adoption of the technology. It is recommended to explore in the future the long-term impact of GenAI integration on school leaders' professional judgements, ethics, and identity.

Irrespective of these limitations, the study points to the promising future of GenAI in educational leadership (Fullan et al., 2024), at the same time indicating the need for specialised training and regulatory frameworks to ensure its responsible and efficient use (Collie et al., 2024). By shedding light on how GenAI is being used, the study contributes to the scarce empirical literature on AI in educational leadership and attests to its potential to empower school leaders in meeting modern educational challenges. Whilst early use of AI in school leadership was limited to innovators (Tyson and Sauers, 2021), its growing integration across leadership functions signals a broader diffusion shaped by task domains, professional experience, and role type. If this development continues, GenAI may reach late adopters and laggards (Rogers, 1995), making AI-assisted school leadership in general, and AI-assisted instructional leadership in particular, a prevailing norm in schools.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Department of Education and Psychology, The Open University of Israel. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

IB: Writing – original draft, Writing – review & editing, Formal analysis, Methodology, Conceptualization.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author declares that no Gen AI was used in the creation of this manuscript.

Publisher's note

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