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Generative AI for School Leaders

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Abstract. This chapter investigates the effects of generative artificial intelligence and digital transformation on K-16 school leaders in the post-pandemic period. It describes the challenges those leaders face in the technology integration processes and recommends developing AI competencies, interdisciplinary curricula and relevant leadership skills. The shift to learning over the Internet as a consequence of the actions that were taken towards the prevention of the spread of covid 19 brought many positives but many education managers continue to face the challenges of educational technology integration. Such factors include the influence of wonderful ideas and the provision of working rooms that encourage teacher collaboration. The chapter proposes plans for creating professional development furthering teachers' modernization of their digital knowledge. It also addresses the aspect of the efficient digital design that helps implement contemporary curricular programs. As soon as they pay attention to these most important items, their schools will be more able to meet the needs of the digital world market, and consequently enhance the students' performance. This chapter adds further discussion of initiatives and projects on school leadership and technology communication integration. It describes specific techniques relevant to today's education and the issues that they face as the environment changes rapidly.

Keywords: Generative AI, Digital Transformation, School Leadership, AI Literacy, Technology Integration

1 Introduction

The aim of the research was to explore the perceptions of K–16 school managers about the challenges that they experienced and how they would address them. The results reveal that school managers still have a very uphill task in relation to making their

institutions technologically enhanced for learning. Alleviating the discrepancy between the problems that were highlighted and the solutions that were provided is important in enhancing the effective integration of educational technology into the schools (Ririyanti, 2024). In reference to the previous wave of radical education reforms, countless issues, such as the concept of multiple assessment tools and modes, the focus on teacher inquiry and development of different teaching modules, individual research papers, reformed core and alternative courses, interdisciplinary course curriculum and methodology, self- directed learning and career history archival with guidance, have all brought about the centrality of the individual back to education (Grassini, 2023). What are the major obstacles faced by K-16 school leaders to make sense of these important decisions, and how might they be assisted? To answer these questions, as part of a larger investigation below to shift the focus of teachers' practices and models in the institutional context these school leaders should foster an interdisciplinary learning community among teachers through professional discourse (Su et al., 2023). Cross-field teaching means the curriculum embedding components from sectors to enhance the students' cross-field knowledge including the attitude towards AI literacy (Kurtz et al., 2024). Therefore, whether it is a problem-based course that spans themes across fields of 'multiple disciplines' or an 'interdisciplinary integration' course that broadens a particular theme under a 'lens' of a particular notion or investigates real-life scenarios and context, harnessing the creativity of both teachers and learners to develop 'Transdisciplinary' subject units on overall themes, concepts and AI literacy elements of a course. (Namoun et al., 2024) pointed out the need for fostering learners' multi-literacy through multi-teaching and meeting the student's learning requirements. In this regard, while educational leadership in a particular domain is concerned in a subject specialization-oriented approach, interdisciplinary school leadership is interdisciplinary pedagogical design thinking, interdisciplinary resource utilization, and dialogue with multi domain teachers / interdisciplinary school leadership (Chen, 2018).

In the wake of the global COVID-19 pandemic, physical teaching worldwide was suspended within a few weeks. This unprecedented situation led to the rapid adoption of online virtual interactive digital learning models (Mohamed, 2024). In light of the increasing decrease in COVID-19 cases, in the US, for instance, about 50% of the population had begun to adopt a work-from-home culture by the second half of March 2020. According to Lansiti & Lakhani (2020), within a fortnight, over 2000 PhDs and MBA distance learners were registered into Harvard Business School, which directed that there were more than two thousand students interested in enrolling into Harvard Business School distance learning programs. The same case occurred in Taiwan when physical schools remained shut from the end of May 2021 and normal schooling practices were totally online for three and a half months, (Stjernswärd et al., 2024). The covid 19 pandemic has led to a profound and extensive strategic and digital shift in educational institutions hence posing a multitude of issues to teachers and school leaders. They need to come up with appropriate strategies for ensuring that during this transition to use of technology, the objectives of the novel curriculum are realized, and students' multifaceted learning requirements are addressed in terms of effective teaching and school

management approaches in cyberspace (Zheng, 2024). This painful switch during this transition is equally important, this article seeks to understand that transition and suggest how school leaders can manage that transition during this age of post pandemic when the emphasis is on digital transformation.

1.1 The connotation of AI literacy transformation in the post-epidemic era

Strategic Intelligence and Leadership in Education. In today society, where digital innovation and Artificial Intelligence rule, strategic foresight and futuristic leadership are essential in fostering creativity, innovation, and continuing education in the organization in order to be nimble and robust (Tsvasman, 2024). This results in the complete amalgamation of cybernetic and systemic principles which essentially shows how competitive edge and ethical congruence are realized by strategic intelligence in technology innovation in education. This progress as seen earlier can be achieved through the means of AI which aids technological infrastructure, decision making and upgrading models of ethicality (Chaaban, 2024). It allows practitioners to devise ways to ensure effective navigation by school leaders through the modern intricacies of education to ensure long term of effective practices. The digital transformation in schools is defined as the change process that enables the appropriate embedding of digital technologies and AI economy strategies into the educational process in children to increase student performance and increase the competitiveness of the institution (Sumalinog et al., 2024). This includes development in the directions of school culture change, Information and Communications Technology (ICT) integration in pedagogy, innovations in teaching and styles of administrative leadership.

According to Saaida (2023), the gradual replacement of functions in higher education with AI technology is capable of changing the very essence of teaching, learning, and various managerial processes in an institution. These institutions can use the machine learning tools alongside digital technologies to facilitate and enhance the learning experience for their students through customized learning programs. Kasmia and M'hamed (2023) have suggested that digital transformation also enhances the operations and management of the school by creating an environment which promotes innovation and maximizes the use of available resources. Technological advancements, combined with pedagogical best practices and visionary leadership, can strategically align higher educational institutions as centers of innovation to meet the ever-increasing expectations of students being prepared for the 21st-century job markets.

Regarding to Lansiti and Lakhani (2020), the COVID-19 pandemic has pushed school administrators who, when prepared for the digital age, felt there was no rush, out of their comfort zones and into the urgency for change. This shift requires them to change organizational processes and operating systems while enhancing the organization's digital scale, scope and learning. According to Bridges et al., (2023), the digital

advancement forced the higher education institutions in Hong Kong to shift to online education, allowing their students to study at home. Such rapid change not only sped up the pace in which digital devices are being adopted but also emphasized the need for a strong backbone, constant support for teachers and students, and formulation of efficient ways of teaching through online and blended learning. The change and creativity in question are at the heart of HEI's development. The digital era has removed spatial constraints to knowledge creation making it easy for school leaders to assemble broader networks (Salloum et al., 2024). This has changed the traditional paradigm of knowledge in that it allows the leaders to be informed, operate in online environments, and utilize digital tools to enhance the teaching, learning and administration of their institutions. Chikoti (2018) has pointed out that there is a process makes them evolve, manage the uncertainties they face in the market, and ultimately thrive in their industry.

Navigating the skills gap and the key insights. According to the "2025 Global Learning & Skills Trends Report" published by Udemy Business, there is an important necessity for organizations to tackle the existing skills gap which has been worsened by technology that is changing so rapidly (Udemy Business, 2025). Major development areas include skills development and validation, building a workplace based on Generative AI (GenAI) possibilities, and transformation of leadership skills requirements. The document further notes that more than 50% of the employees will need to be retrained by the year 2025 which will require a transition to skill-based organizations. Companies that successfully combine these strategy areas may improve employee productivity, engagement, and flexibility and are poised for further success as the ongoing transformations to the workforce and technology ecosystems continue (Udemy Business, 2025). The finding of the "2025 Global Learning & Skills Trends Report" issued by Udemy Business highlights such transformation in the provision of learning is unavoidable due to the fast-growing emergence of technology (Udemy Business, 2025). Key focusing areas include incorporating skill development and verification, creation of GenAI workplaces, and innovating the changing scope of leadership roles (Geyer, 2024). (Geyer, 2024) also stated that the percentage of more than 50% retrained employees will be common by the year 2025 which will entail a shift to skill-based organizations. Organizations that have a successful integration of these elements of strategy may be in a position to enhance their employees' productivity, engagement, and even flexibility and will be in a better position for further success as the changes in the workforce and the technology ecosystems are around and still transforming in this case as Udemy Business 2025.

Digital transformation requires new types of leadership thinking. As indicated by Lakhani (2020), Lakhani states that the task of school leaders in the technology's era is to find ways of leading their organizations and at the same time includes a number of important aspects. As noted by Musaigwa and Kalitanyi (2024), school leaders should embark on a top-down digital transformation and be at the forefront to champion the creation and nurturing of talents of digital leaders in their institutions. Moreover, Aithal et al., (2024) noted that innovative teaching techniques can reduce the innovation cost and enhance participation while expanding success avenues for many institutes.

Likewise, Atencio and Acuña (2024) argued that a fundamental concern in tertiary education is designing an environment free of discrimination and violence. Specifically, they supported the implementation of mechanisms that ensure the organization people's privacy and intellectual property while ensuring openness and joint innovations. Al-ma'aitah (2024) went further to consider enabling online communities to co-edit which would help in building a culture of pluralism reducing prejudice and enhancing innovation in the operational models of organizations. Yuen and Lam (2024) added that by tapping into the collective intelligence of their assorted networks, companies can surmount obstacles and boost teamwork efficacy. If organizational problem solving becomes a requisite, so does the need for versatile leadership training programs that cater for the needs of ever evolving students who grew up in a world where online content is commonplace. Julita and Zulyusri (2023) concluded that all round growth in educators is cardinal to ensure that they can proficiently equip students fit for the complexities of the modern educational system. According to Wharton-Beck et al., (2024), the central role of school leader is essential when enabling the success of educators and learners in a world that is becoming more globalized, by ensuring that the necessary tools are available for the digital age, so long as an innovative culture is fostered.

Digital transformation changes the connotation of teaching leadership. Firstly, McCarthy et al., (2023) explored the evolution of the concept of teaching leadership, pinpointing the stage of "Digitalization". This stage encompasses generating modern electronic files which are in the form of online worksheets, and also that every teacher gets their handheld devices such as smartphones and laptops. Berkovich and Hassan (2024) argued that if the principals have sufficient digital instructional leadership any teacher should be willing to talk about their classroom experiences, then he should encourage the teachers in the classroom to facilitate, assist and support the teachers in transforming such materials to a digitized format. Such tasks require appropriate teaching materials including computer-assisted instruction, electronic file collection, student work evaluation, and instructional material preparation. Nadan (2024) stressed that as instructional leaders, there is a need to enable teachers to conduct enriching conversations that will improve teaching material and use software designed by the teachers to help assess students so that the students are able to learn and remember better. Secondly, Biškupić et al., (2022) pointed that the integration of the school administration and teaching applications with the platform of digital tools was the main concern during the 'digital optimization' stage. Gupta et al., (2024) noted that while higher education institutions have adopted various digital tools, the sector remains only partially digitalized, hindering comprehensive transformation of traditional educational models. Thirdly, Hassell (2023) pinpointed that digital transformation is crucial to the teaching leaders availing the ability to translate the holistic digital optimization tools into practice at scale. This comes with improving teaching process management, recruitment of educators, collation of enormous data and application of the Internet of Things (IoT) devices and eventually, the school becomes an intelligent campus. Arufe-Giráldez et al., (2023) emphasize the need for school leaders to enhance digital support for teachers, analyze student data, and foster creativity to create a more effective learning environment.

Lastly, Demartini et al., (2020) expressed their views over the fact that the institute digital transformation of K-12 schools might be viewed as a spectrum model. The professional education sector begins to acknowledge the persisting possibilities of the digital transformation seeking to enhance the efficiency, interactivity and cost effectiveness in large-scale training system management. An example of this strategic approach is the "Riconnessioni" project, which was launched by Compagnia di San Paolo together with the Ministry of Education and designed by the Foundation for the School. Then the strategy for the digital transformation focused on the use of emerging technologies in jurisdictions where there is a clear need for the same. Also, phases were envisaged such as linking the different components, preparing for a future digital environment, and establishing synergies for an ecosystem that is people-centered, process-centered, and technology-centered that is secure and innovation-driven. Ukeje et al., (2024) aggregated that such a participatory approach allows educational institutions to use new technologies in order to transform their operations and be more agile in the changing digital landscape.

1.2 Practical Actions of cross-field Teaching Leadership in Digital Transformation in the Post-epidemic Era

Embracing Interdisciplinary Learning in the Digital Age. (Chen, 2018) analyzed of curriculum and teaching reforms in various countries in recent years points out that countries have changed curriculum concepts and teaching methods to respond to the ever-changing development of new technologies and future talent cultivation needs, moving towards cross-disciplinary curriculum and teaching design. For example, the leaders from Hong Kong, China, Taiwan, etc., are all heading towards an interdisciplinary, integrated, thematic, literacy-oriented curriculum and teaching model (Wan et al., 2024). The most important core of this new wave of curriculum reform emphasizes literacy-oriented teaching and multiple assessments. The curriculum is oriented towards cross-field inquiry thinking and maker practice integrated with life to enable students to acquire transferable abilities and adapt to future life. In developing learning models of group cooperation and team learning instead of traditional narrative teaching, the school leaders should make good use of educational technology and organize professional learning communities for teachers to conduct teaching reflection and dialogue to develop cross-field literacy teaching, create an appropriate learning environment, and promote students to develop independent learning through cloud digital tools and achieve the educational goals of the new curriculum (Haleem et al., 2022).

As Kharma et al., (2021) expressed, the devastating effects of the pandemic have permeated every aspect of society, including education, thus transforming the traditional approach to learning which was taken mostly in face-to-face classes to a combination of in person learning to a blend of virtual. According to School leaders, the blend has

encouraged diversity and speed in the teaching methods utilized while enhancing that of the students. On the other hand, there is no literature that allows for a fully opposition by conducting a comparative analysis of such teaching models. Responding to the Pandemic, the Cuban education system adopted the motto "Suspension of classes but not of learning." Some authorities were unable to countenance complete cycling of students and teachers and ruled out the necessity to move to such arrangements while working from home was permitted (Cui et al., 2023). As school leaders have shown throughout their leadership explorations, there still exists the need for teachers' self-studies, however self-teaching of educational technology applications in this discipline should be accompanied with severe digital transformation in order to enable the understanding of the impact of such on interdisciplinary teaching. This understanding could allow one to design appropriate cross-carrier teaching leadership development strategies that support educating students during the epoch of the fourth industrial revolution (Lin, 2024). In Line with this, there is a growing recognition that education students require cross-domain teaching competencies particularly in the transdisciplinary world we live in now. New strategies, which are not yet well understood, come to cross-cutting leadership thinking. Teachers need to design and implement valuable learning spaces in the cloud and prepare their students for the future by developing literacy across content areas. There is a need for a balanced approach to the training of leaders in order to prepare the teachers to encourage cross discipline learning which can unleash the capabilities of students of the digital age in meeting the requirements of present-day (Skenderi & Skenderi, 2023).

Cross-disciplinary leaders for digital transformation should build a complete digital environment. The success of cross-domain teaching leadership hinges on whether the learning environment addresses the needs and patterns of digital-native students. To this end, school leaders have invested significant funds to develop a digital environment and implement smart classrooms (Kaur et al., 2022). According to Li et al., (2022), who see the matter as relating to cross domain teaching leadership, providing comprehensive digital technologies and environments including AR/VR or metaverse can meet cross-domain learning students' imaginations for learning effectively for experiential inquiry and practice.

Improving leaders' educational technology application capabilities is the starting point for cross-field leadership in digital transformation. Borasi et al., (2024) also consider providing better educational technology solutions to address infrastructural issues. An AI platform that will be universally adopted for easy collaboration is part of the "right infrastructure". With this method, learning became shared and therefore promoted smooth digital change allowing for easy exiting from weak tools of technology (Shi & Ye, 2023). These steps will improve educators' capacity to apply digital tools and technologies in their practice. They will devise teaching methods which involve making with and learning alongside students like recording videos, engaging in online communities, and using personal media to develop teaching content and create instant fan clubs (Bergdahl et al., 2020). Therefore, it was

recommended by Ymana et al., (2021) that school leaders scout for improved platforms for learners along with identifying best online-teaching resources. Such include online assessment submission and evaluation, group teaching through virtual classes, online voting, co-editing as well as different interactive platforms. Moreover, converting course materials into online gamification among other technologies is a necessary skill set that must be acquired and deployed. In her opinion Tigere (2020) stressed on effective tech leadership being important in driving educational digital transformation.

There may be teacher resistance to required changes if educational and communication technology (ECT) is not a strong suit for school administrators (Duru et al., 2021). Therefore, there is the essential of training principals on ICT skills so that they can execute successfully digital learning initiatives. The leaders of schools who are capable should make sure that their teachers stand up on the path of digital change through resource sharing across fields, improved digital literacy, collaborative practices across disciplines as well as utilization of social media. This mode helps in co-creation of courses and supports accelerated self-study responsive to the digital changes. Furthermore, it explores AI-driven education transformation and suggests integrating methods (Xiaoyong et al., 2023).

Cross-disciplinary leadership for digital transformation should consider both administrative management and teaching curriculum orientation. Koh et al., (2023) recommend that school leaders establish a school-wide support system and integrate resources across higher education institutions. A focus should be placed on creating a comprehensive administrative system, hiring or training digital talent, and transforming the thinking and practices associated with traditional teaching and learning models. A school leader is highly urged by Joseph et al., (2024) to use his or her administrative power to drive digital transformation in education. This requires the merging of teaching resources with comprehensive big data platforms and provision of cloud-based tools for classrooms and laboratories management to teachers. School leaders should encourage cross-disciplinary interaction where educators from different backgrounds bring forward suggestions and have access to real-time, multi-domain materials (Zeng et al., 2023). By applying this method, teachers will be encouraged to co-develop innovative cross-curriculum subjects more easily. Teacher adjustment and learning may be facilitated through these joint efforts by school leaders as expressed by Dionne & Carlile (2024). The school administration can take advantage of AI in managing office work, communication, and analytics for decision-making (Udemy Business, 2025). It can also be used for GenAI in the making of specialized unique learning experiences for students as well as staff. The school leaders can create a flexible learning space that encourages creative thinking and raises the level of competence (Chiu, 2024). This visionary approach to integration processes allows the teachers to be ready for the forthcoming challenges and also promotes the active engagement of students during the learning process taking into consideration the fast changes in the environment Fios et al., 2024).

Cross-disciplinary leaders in digital transformation should encourage the development of digital interactive models with teachers and students. With Freire (2020) mentioned that "dialogue is an encounter of interlocutors in the course of mutual reflection and action". Ross (2024) discovered that education dialogue exceeds just teacher-student connections; it encompasses teachers' deliberate thinking about what kind of communication they would like to promote, how they can facilitate this process, and what instruments should be applied. Critics argue that cloud learning often lacks meaningful interaction and emotional communication since teachers or students may converse with themselves or devices hence impeding consensus and trust. One educator noticed that there is no face-to-face interaction during remote or digital education and it can make students feel lonelier (Photopoulos et al., 2023). For this reason, cross-domain leaders should encourage teachers as well as students to discover their minds so as to create new integrated cross-domain concepts together. Wells and Arauz (2006) found that dialogue has become increasingly essential for teachers and students to jointly create, explore, and navigate the world. The challenge lies in enabling teachers to facilitate cross-domain discussions via cloud plat-forms and utilizing online interactive learning models to foster collaborative creation and learning (Duru et al., 2021).

1.3 Recommendation and Conclusion

In the post-epidemic era, digital learning technology and AI in education have been fused into K-16 programs hence providing leaders with dilemmas as well as chances for them to effectively transform their schools digitally. The article highlights interdisciplinary instructional leadership as the way of addressing this complexity while calling for setting up collaborative settings on AI literacy and innovative pedagogical approaches. School principals need targeted teacher professional development programs to enhance their instructors' digital competences that are required to successfully integrate educational technologies. Additionally, through collaborative networks, encouraging inter-disciplinary dialogue will assist in building a strong educational technology infrastructure that supports interactive learning (Podgorska & Zdonek 2024). This study posits that a literate-oriented style of teaching would best serve the interests of students by being consistent with an interdisciplinary outlook necessary to prepare them for an ever-changing digital environment dominated by AIs. Presently, there is a fast-growing interest among educators in cross-disciplinary instructional leadership where educational technology has started changing traditional ways (Nieto-Taborda & Luppicini 2024).

Moreover, in the field of social networks digital transformation discussion that we have here, the quick rise of cross-disciplinary instructional design and course platforms has been depicted as it occurred in an expanding online world. This means that future policies should be aimed at enhancing instructional leadership across disciplines by successfully aggregating digital resources and giving priority to student engagement. Habes (2024) recommended that school leader must encourage utilization of digital platforms as well as foster multi-directional dialogue amongst teachers that will allow different perspectives to coexist and transform into inspiration. Additionally, Groenewald (2024) also pointed out that including various online platforms is equally important to ensure interdisciplinary teaching leaders are fully community ready with

all necessary resource.

Lastly, Giacumo et al., (2024) wrote about interdisciplinary instructional leadership which will improve student learning outcomes by deeper reflection on instructional design and constant revision of strategies aiming at enhancing effectiveness and equality in education. The article concludes by saying that schools' key stakeholder leaders can employ generative AI technologies so as to increase productivity and students' performance hence preparing educational institutions towards better equipping for future challenges or opportunities.

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