Principals' Digital Leadership: Connotation Structure, Development Status, and Improvement Path

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Abstract: The study of principals' digital leadership plays a significant role in the digital management of schools as well as in improving the learning experience for students. This paper systematically researches the characteristics, connotations, and evaluation methods of digital leadership and discusses how it differs from information leadership, as well as the various dimensions that need to be considered when evaluating digital leadership. As a result of various researches on the connotations and evaluations of the principal's digital leadership, this paper also aims to explore the different promotion paths based on our research. The paper demonstrates how digital leadership, which is an entirely distinct form of leadership that is transformed into a transformative leadership style, has a positive impact on educators, students, parents, and communities and that all levels of school systems need to take steps to ensure principals are held more accountable in the administrative and academic spheres.

Keywords: principal, digital leadership, evaluation dimensions, improvement path

1.   Introduction

There has been a continual update and iteration of digital technology throughout the development process of the information age, which has made the use of digital technologies more and more widespread in the field of education. The advent of the "Internet Plus" model throughout the educational sector has provided a new perspective on the management and construction of digitized school educational resources in the 21st century. The National Education Technology Plan emphasizes the importance of technology development in the classroom in order to enhance the infrastructure of schools from pre-kindergarten to grade 12 [1]; England [2] and Scotland [3] also actively promote the construction of learning platforms. Especially after COVID-19 in 2019, three nations in the UK apart from England created a national learning platform, e.g., GLOW in Scotland, which provides teachers, students, and parents with online learning guidance and resources to cope with distance learning [4]. Malaysia Ministry of Education (MOE) has developed an ICT Transformation Plan for 2019–2023 to support the Malaysian Digital Education Agenda [5]. Therefore, it can be said that the current development of digital education is in full swing.

There are increasing challenges facing the education industry, especially in today's digital age. To assist schools in achieving these goals, school leaders should develop the ability to use digital technologies in their school management and administration processes [6]. During the course of his or her role as the soul of a school, the principal integrates modeling and integration technologies into

the school's management and administrative practices, shouldering the responsibility of guiding the school's development as well as improving its teaching [7].

The primary objective of this article is to analyze and describe how the principal achieves success in digital leadership, including its connotations, characteristics, and methods. Also, as part of the proposal, it aims to tie together the promotion pathways for digital leadership at various levels in this country at present. This will create a systemic connection. It is intended that this process will lay the groundwork for the future development of central leadership for digital initiatives.

2. Interpretation and Understanding: The Connotation and Definition of the Principal's Digital Leadership

2.1. The Connotation and Characteristics of the Principal's Digital Leadership

An integrated approach to management and competence is envisioned as a key component of digital leadership. This is a change in leadership in education managed using digital devices to ensure schools' overall quality meets the latest digital transformation requirements. This transformation process requires principals to motivate, coordinate, and evaluate all stakeholders' efforts to learn about digital devices and technologies as a medium for teaching and learning while fulfilling the school's vision through strategic planning [8], especially during the COVID-19 pandemic [9]. Karahan, Canbazoğlu Bilici, and Ünal [10], and Bernhardt [11] all believe that in the new stage of the development of digital technology, it is apparent from the above discussion that the principal's effective management of the education system is of great significance and will have an effective impact on the teachers' teaching practices and on their use of technology in the classroom. Therefore, the principal's digital leadership is the principal's combination of digital equipment technology and transformative management capabilities in the digital age, including strategic planning, vision setting, and communication with all stakeholders.

Specifically, the principal's digital leadership affects the teachers' digital teaching practice. Students can get motivated to learn and perform better with digital technology-based teaching. In addition to enhancing the implementation of teaching and learning with digital technologies, these technologies can create a positive learning atmosphere for students, both online and off-line, while improving their integration with teaching and student learning effectiveness. According to Sheninger, the reality is that there are still many principals who are not able to use digital technology skillfully [12]. They are even unwilling to do so, such as those who do not understand social media's role or the advantages of using digital devices. This is because they are unaware of the advantages of possessing digital devices. There are some principals who lack competence in the area of information and communication technology (ICT). For today's educators to properly prepare for school digitization, they must ensure their skills and knowledge are up-to-date, as this will guide the development of these technologies in their schools and expand these practices into the school learning environment [13]. Principals who wish to achieve digital leadership need to appropriately use their space and opportunities within the school [14].

2.2. The Difference Between the Digital Leadership and the Information Leadership of the Principal

Aksal believes that the integration of information and communication technology (ICT) into leadership practices represents the integration of technology into leadership practices within an organization, as well as the learning environment of schools, which are important components of the strategic plan for the education system [13]. The development and application of more and more technologies have become inevitable requirements of contemporary educational development standards. The development and dissemination of these interactive learning environments largely

depend on the principal's sense of responsibility for developing school culture and technology. In addition, ICT integration is not only creating learning environments but also increasing ways for schools and partnerships, such as collaboration between teachers and families, to facilitate better functioning of school activities at all levels.

It is important to note that the definitions of "digital leadership" and "global leadership" have not been clearly defined. Some studies have defined "digital leaders," that is, leaders of digital enterprise organizations. Specifically, in addition to business knowledge and strategy, leaders also possess unique digital expertise (digital intelligence) [15]. According to the European Commission study, "digital leadership" encompasses competitive and innovative e-skills, vision, strategy, and vision goals, including ICT skills. According to Antonopoulou Halkiopoulos and Beligiannis's model , a digital leader consists of three components: The first is strategic leadership: guiding interdisciplinary teams; the second is corporate expertise: the development of business, organizational and managerial frameworks that contribute to the value of educational institutions by applying them to business problems; and the third is technological knowledge: leveraging emerging trends to envision and improve digital skills to enhance the success of educational institutions [16]. There are several elements of leadership that leaders need to take into account. Sheninger suggests that today's learners are different due to the impact of technology, this is something leaders must understand and as a result their teachers and administrators will need to re-imagine the role of technology in the classroom in order to meet their needs [12]. It appears that there is a disconnect between the current school culture and the principal's leadership style cannot keep pace with the digital culture and style of leadership, a disconnect that is increasingly evident in the digital age. that exists today. The concept of digital leadership refers to a distinct kind of leadership that emphasizes the relationship between leaders and technology. A digital leader is not only someone who applies technology to schools but also sees school culture through a strategic view that emphasizes participation and success, rather than merely focusing on technology [13]. Principals tend to be more concerned about their ability to lead a school's transformation rather than their age or experience. Principals should be aware of their impact on their staff, students, parents, and communities as digital and transformational leaders in supporting a culture of innovation.

Looking across the education system, filling the digital leadership skills gap requires a number of steps. First, work with partners in demand to strengthen the supply of processes for developing instructional products. Second, promote the development of educational systems aligned with current curriculum and content styles and enhance digital leadership. Third, promote the continuous development of new ICT software. To summarize, in an academic setting, a competent leader who possesses the imperative digital skills can ensure that their leadership skills are used more effectively, that administration is managed more efficiently, and that responsibilities are assumed more successfully. Furthermore, it has been proven that a digital leader who has the necessary digital skills and tools to use effectively in an academic setting is more likely to identify and take advantage of opportunities in order to optimize the outcome of his decisions.

2.3. Evaluation Methods for the Digital Leadership of Principals

Digital leadership bridges the gap between leadership and teaching technologies. It is also known by other researchers as educational technology leadership [17], information and communication technology (ICT) leadership [18], technology leadership [19], and electronic leadership [20].

In 2009, the International Society for Technology in Education (ISTE) renamed the National Educational Technology Standards (NETS)—Administrators Standards (NETS-A)—to ISTE-A to help education leaders better prepare to lead in a rapidly evolving digital world.

In 2009, ISTE-A became the new National Educational Technology Standards-Administrator Standards. This was renamed from the original standard (NETS-A), and the International Society for

Technology in Education (ISTE) wanted to help education leaders be better prepared for digital leadership in a digital world. There is no doubt that this standard is intended to serve as a guide for all school administrators who are interested in fostering digital learning in schools. Visionary leadership, digital era learning culture, excellence in professional practice, systemic improvement, and digital citizenship are the five dimensions of digital leadership proposed by the ISTE-A standard.

Leadership that inspires, leads, develops, implements, monitors, and improves a shared vision of fully integrated technologies that support excellence and promote organizational transformation is referred to as visionary leadership. Visionary leadership is the process of inspiring and leading others [21]. Creating, promoting, and maintaining a dynamic, digital-age learning culture is defined as ensuring the provision of rigorous, relevant, and engaging education for all students by creating, promoting, and maintaining a dynamic, digital-age learning culture [21]. Professional excellence is defined as the use of contemporary technology and digital resources to enhance students' learning experiences by enabling educators to ensure that students are learning as much as possible while utilizing professional learning and innovation [21]. System improvement is defined as the continuous improvement of leaders and management in the digital era through the effective use of the organization's information and technology resources [21]. An incredibly critical part of digital citizenship is promoting awareness of the complex social, moral, and legal issues that relate to the responsibilities that are associated with evolving digitalization, as well as modeling and promoting it [21].

ISTE-A has been a useful tool for exploring and examining digital leadership skills, and many studies on ISTE-A have been conducted to look at various indicators of digital leadership standards in addition to evaluating the digital leadership skills [22]. There is a great deal of discussion about how administrators build a shared vision for online courses through collaboration with students, faculty, and stakeholders [23]. Lecklider identified 21 ways to develop a digital learning culture and presented one example of conducting educational innovation [24]. Compared to other indicators, survey results emphasize the need for professional practice to be placed at the top of the priority list. Using the ISTA-A Evaluation Survey (PTLA), Banoglu tested the digital leadership of principals by adapting the ISTA-A Evaluation Survey (PTLA) [25]. Furthermore, each dimension is compared and discussed in detail in the report. Based on the statistical results, it can be concluded that visionary leadership is the least valuable type of leadership. In schools with female principals, communication and collaboration skills significantly impact the vision for technology. Female principals can create a common vision for the school through their ability to communicate and collaborate with other educators. Metcalf and LaFrance Measure readiness for technology leadership in five topics under ISTE-A criteria [26]. A comparison of digital citizenship and visionary leadership shows that digital citizens have the highest level of readiness, while visionary leadership is valued the least. Curnyn believes that visionary leaders should take the lead and consider the impact of technologies in emerging markets on learning and teaching into consideration [27]. Richardson showed that improving the system and digital citizenship received less and less attention, and it is necessary to study these two indicators [22]. As a result, systematic improvement is a significant part of the positive impact on the digital learning culture [24]. Moreover, the combination of visionary leadership and systemic improvement is highly important for a digital learning culture [28].

In addition, technical resources, such as the encouragement of technological innovation by technical coordinators, are identified as major contributors. This is consistent with the research of Metcalf and LaFrance [26], Larson, Miller, and Ribble [29] propose considering five criteria. It describes a technology program integrated into the classroom to create a creative and innovative learning environment. They use a systems perspective to approach technology integration, attend ongoing professional development programs, and conduct appropriate technology use evaluations throughout the curriculum. Garcia and Abrego interviewed five principals and investigated 67 active

primary school principals to explore the basic skills of digital leadership [30]. Four themes consistent with ISTA-A standards are summarized as "basic skills leadership in digitization": familiarity with software and hardware, use of information and data retrieval, communication with stakeholders, and resource planning and management. In the study of Antonopoulou, Halkiopoulos, and Beligiannis , they adopted a multi-factor leadership questionnaire (MLQ) is considered a valid way to measure leadership types [31]. On a scale of 1 (not at all) to 5 (almost always) as a measure of frequency of participants, participants were asked to rate how often they performed a particular behavior by responding. Furthermore, five questions were used to assess each individual's digital leadership capabilities, as well as questions about their experience and knowledge of specific digital skills. They encoded the data, analyzed it using SPSS 21, and compared descriptive data with diffusion or Pearson's 2 analysis. Hasin and Nasir conducted a questionnaire survey on all samples using a quantitative cross-sectional survey [32]. The Principal Technology Leadership Assessment (PTLA) [8] and the Educator Technology Self-Efficacy Study (ETS-ES) were applied, adapted from Domeny [33]. The two tools, adapted from 32 digital leadership dimensions, are investigated to determine the digital leadership level of principals by reasoning analysis and multiple regression analysis [32].

It can be seen that the evaluation of digital leadership by principals mainly includes five aspects: visionary leadership, digital era learning culture, integration and improvement of technical resources, communication with stakeholders, and digital citizenship.

3. Improvement Path

3.1. Principals Themselves Should Constantly Upgrade Their Digital Technology and Skills

The list of digital skills that digital education leaders must possess lists some skills that can help shape a comprehensive digital education environment, including social platforms, cloud computing, mobile applications and web development, big data, ERP systems, security skills, digital architecture, and complex business structures [31]. Principals should motivate, coordinate, and evaluate the efforts of all stakeholders to absorb digital devices and technologies as a medium for teaching and learning and to fill gaps in technical knowledge.

Specifically, the application of social platforms can increase research extroversion and convenience and promote communication inside and outside the school. In recent years, cloud computing has become a vital part of an organization's digital business strategy, which means that all enterprise systems must be connected to the cloud. Develop applications related to subject knowledge to serve the scientific community. It is very significant to understand that big data is very useful when it comes to analytics and the discovery of information. In order to optimize workforce and material resources, an ERP system automates the process of doing business to save time and money. In order to address complex issues such as who has access to what data and with what privileges, information security skills are particularly important to address the issue of information privacy. Digital architectures, such as cloud architectures, can effectively improve responsive practices in digital ecosystems. A complex business structure can be customized according to the specific requirements of a school in order to meet these requirements.

3.2. Principals Work with Teachers, Students, and Other Stakeholders to Create a Vision for Digital Co-development

According to Hasin & Nasir, although there are considerable improvements to be made in how principals use technology in the administration and management of their schools, there is still room for improvement in digital leadership [32]. An analysis carried out by Zhong found that principals needed to utilize a hybrid approach to support teacher communication and implementing teacher standards [34]. They included the use of digital instruction, conferences, collaborative groups, and

social media for administrative affairs, online learning, and professional development. They also recommended the use of a hybrid approach by principals. In addition to these findings, Tibagwa, Onen, and Oonyu also found that principals must cooperate with school stakeholders to strengthen the process of developing teaching products and promote the development of an education system consistent with the current curriculum and content style [35]. The principal accomplishes the vision and mission of the school through the continued use of technology in academic monitoring to enhance strategic planning.

Effective communication between principals, students, teachers, and other stakeholders can ensure the smooth integration of technology and resource allocation and can motivate, cultivate, and support administrators in keeping up with technology trends. Banoglu also indicated in his study that stronger communication and collaboration abilities could better establish a common vision of development with other educators [25].

3.3. Education Administration Departments Provide Support and Guarantee the Digital Leadership Promotion of Principals

Along with the innovative application of digital technology promotion, it is also pertinent for principals to comprehend and be responsible for the ethical and legal issues associated with digitization. Additionally, they must ensure that learners are provided with equal access to digital tools and resources and that digital information technologies are used in a regulated manner. However, behind this, currently, there is an urgent need to match the policies and mechanisms of the education management department, to develop a mechanism for co-constructing and sharing digital education resources, to promote the reformation of education governance, and to accelerate the establishment of a system for managing and monitoring education. In the process of the integration and innovation of information technology with education and teaching, the vision of education modernization can only be completed with the cooperation of education departments, schools, teachers, and students. Therefore, the support of the policy and mechanism of the education administration department is the key guarantee for the realization of digitalization in schools.

4. Conclusions

A critical aspect of the digital transformation of a school is its principal's digital leadership. This paper examines the connotations, characteristics, and evaluation methods associated with this leadership. The digital leadership of principals is currently hindered by a multitude of deficiencies and challenges that are affecting their performance. For the digitalization of society to continue to grow at the current level, we need to continue to provide better and closer cooperation at all levels. This will enable us to make the process a success. We believe that our students will be able to get more benefits from our principal's digital leadership if he or she takes a comprehensive approach.

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