







Socio-demographic determinants of Filipino school leaders' digital leadership

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ABSTRACT

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The field of digital leadership in the Philippines is limited, despite the country's growing regard for school digitization. This study investigated the socio-demographic factors such as age, gender, years of service, educational attainment, location of school, and type of school, that influenced Filipino school leaders' digital leadership. A cross-sectional survey was conducted with 386 school leaders, selected through convenience sampling technique. The data was collected through an invitation link to a questionnaire survey distributed through various social media platforms. Descriptive data using frequency and percentage, and independent t-test and one-way analysis of variance (ANOVA) were employed to examine the variables of the study. The study found that younger male leaders working in urban or private schools, or those who were relatively new in their leadership roles, with higher educational qualifications tend to have higher levels of digital leadership. This meant that socio-demographic factors of school leaders can influence their digital leadership. The study also emphasizes the critical need for in-depth research into the nature and implications of digital leadership in the Philippine educational landscape, focusing on how socio-demographic factors influenced the adoption of digital leadership skills. The study's findings implied that government and educational institutions need to take a more proactive role in supporting the development of digital leadership skills among all school leaders, regardless of their socio-demographic backgrounds. This includes providing training and support, and creating a more supportive environment for digital leadership.

Contribution/Originality: This research illuminates the digital leadership landscape in Philippine education, uncovering socio-demographic determinants. It highlights that younger, urban, male leaders in private institutions with advanced education excel in digital competencies. This study uniquely proves the need for targeted training, bridging technology divides, and fostering inclusive digital leadership across varied leader profiles.

1. INTRODUCTION

The COVID-19 pandemic has driven technology and innovation into the heart of almost every education system worldwide (Vegas & Winthrop, 2020). In the past, technology was often seen as a supplement to traditional teaching methods, but the pandemic has shown that it can be a critical tool for delivering instruction and supporting student learning. Educational technology is no longer seen as a temporary "emergency tool" for learning challenges but as a

way to create richer and more engaging learning experience (Kerres & Buchner, 2022). The post-pandemic education system relies heavily on technology to help students develop literacy, problem-solving, and collaborative skills, which are essential for lifelong learning (Vegas & Winthrop, 2020). This situation further establishes how technology is crucial in teaching and learning, especially in the age of Education 4.0 (Rasli, Tee, Lai, Tiu, & Soon, 2022).

Education 4.0 refers to the strategic utilization of technological tools in educational institutions to enhance efficiency (Sharma, 2019). It is closely associated with the fourth industrial revolution, which is characterized by advanced technologies like artificial intelligence, robotics, and the Internet of Things. Ellahi, Khan, and Shah (2019) argue that these technologies have the potential to enhance learning experiences and facilitate transformative education. ICT in education can offer valuable assistance to teachers, students, and the learning process in general (World Bank, 2020). Therefore, it is necessary to establish a collaborative effort among education stakeholders, with a focus on digitalization as a fundamental principle. This will enable a more adaptive leadership approach to Education 4.0 (Tanucan, Negrado, & Malaga, 2022).

Digital leadership is the ability to use technology to create a well-organized system that establishes direction, influences social action, initiates sustainable change, and establishes relationships. It is a more innovative style of management that promotes radical change in education and is known to improve and encourage digital teaching and learning (AlAjmi, 2022; Aldawood, Alhejaili, Alabadi, Alharbi, & Skinner, 2019). Zhong (2017) emphasized that school leaders play a vital role in digital leadership. They can inspire school transformation using technology, sustain a digital learning culture, support technology-based professional development, provide digital management, and manage social, ethical, and legal issues related to the digital age. Hence, digital leadership is essential for schools that want to stay ahead of the curve and provide students with the best possible education. By using technology effectively, digital leaders can help schools improve student achievement, increase teacher productivity, and create a more engaging and productive learning environment (Trenerly et al., 2021).

While most studies on digital leadership focus on Western contexts, there is a growing body of research on digital leadership in the East, such as Kuwait (AlAjmi, 2022) Malaysia (Hamzah, Nasir, & Wahab, 2021) and Turkey (Karakose, Polat, & Papadakis, 2021). However, research on digital leadership of school leaders in the Philippines is still limited. A study by Asio and Bayucca (2021) found that the digital competence of school leaders in the Philippines varies and that there is a need for professional development to improve their technical skills for school management functions. Another study by Macatuno-Nocom (2019) found that higher education deans in the Philippines are not perceived by their faculty members as effective digital leaders. The study found that deans are not using technology to its full potential to support teaching and learning. This is a concerning finding, as digital leadership is increasingly vital today, with technology being seen as a critical factor for an organization's effectiveness (Tanucan, Hernani, & Diano, 2021).

According to Chen, Chen, & Chen (2010), Le, Tran, Le, & Le (2021) and McMurray, Islam, Sarros, & Pirola-Merlo (2013), as schools become more digitalized, it is important to understand the factors that influence the behavior of school leaders. These factors include their socio-demographic profile which can influence how leaders make decisions, set goals, and interact with others. With the status of the school leaders' digital leadership in the Philippines, more research is needed on this area, including the socio-demographic factors surrounding digital leadership in the country. Digital leadership is essential for the Philippine educational system to take flight towards Education 4.0, and school leaders play a critical role in this transformation. As Tanucan et al. (2022) argue, school leaders are positioned to develop digital classrooms and instructional practices to sustain the innovations needed by evolving digital learners.

2. REVIEW OF LITERATURE

As schools lead the way in incorporating digital leadership into the 21st century, it is crucial to consider the factors that influence the behavior of influential leaders, such as the socio-demographic profile (Chen et al., 2010; Le

et al., 2021; McMurray et al., 2013). A socio-demographic profile refers to the characteristics of a population group, such as age, gender, race, ethnicity, socioeconomic status, and so on. These characteristics can influence how people think, feel, and behave. In the context of leadership, the socio-demographic profile can influence how leaders make decisions, set goals, and interact with others.

2.1. Gender

Gender is a socio-demographic factor that can influence leadership style. Men and women leaders tend to display different leadership styles, according to Elechi (2014). Early theories of leadership, such as Vroom and Mann (1960) decision-making model, have suggested that gender differences can lead to significant variations in people's leadership abilities. Brandt and Laiho (2013) found that gender can influence a leader's behavior, citing that male leaders were more likely to exhibit challenging behavior, while female leaders were more likely to exhibit gratifying and empowering behavior. Regarding technology use and leadership, gender had a significant influence. Some studies suggest that males have an advantage over females in online learning environments due to their greater perceived ability, comfort, and computer engagement (Ashong & Commander, 2012). However, the results of research on this topic are mixed. While males tend to have greater confidence in their abilities in information and communication technologies (Broos & Roe, 2006; Meelissen & Drent, 2008) this pattern is inconsistent across all age groups or educational levels (Vekiri & Chronaki, 2008). A recent meta-analysis found that young women have higher competence beliefs regarding learning in digital settings than young men (Perkowski, 2013). Overall, studies on the relationship between gender, leadership style, and technology use are mixed. Examining how gender and digital leadership intersect could provide a better understanding of how the former influences the latter.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to gender.

2.2. School Location

A school's location may significantly influence its leaders' digital leadership. For example, in rural areas, school leaders may need help accessing and using digital resources, as they may be located in areas lacking access to computers and other technology (Konyana & Konyana, 2013). Additionally, the scarcity of computers and internet access is a common problem in many rural schools (Cabotaje, Alampay, & Berse, 2021) which is often a challenge for school leaders in implementing digital learning initiatives and supporting teachers in using technology in their classrooms (Pangket, 2023). People from rural areas are more likely to live in areas with poor internet connectivity and less access to computers and other digital devices (Kurt & Ciftci, 2012; Tanucan et al., 2021). This can make it challenging for them to participate in online activities such as education, employment, and social networking (Tanucan & Bojos, 2021) as they are also less likely to have the skills and knowledge to use digital technologies effectively (Heinz, 2016).

In urban schools, professionals are more likely to receive formal training on technology, while those in rural areas are more likely to receive informal training (Yentes, 2015). Also, school leaders in these areas are typically provided with resources for their constituents, which are vital for supporting digital transformation and technology-based professional development in their schools (Karakose et al., 2021). However, while school leaders in urban areas may have more access to digital resources, they may also face other challenges, such as managing larger schools with more students, stakeholders, and staff (Doe, Shindano, & Kimolo, 2022). Additionally, urban schools may be more diverse (e.g., diversity of students' backgrounds) (Auxier & Anderson, 2020; McFarland et al., 2019) which can make it challenging to develop and implement digital learning initiatives that meet the needs of all students. The literature shows the nexus between a school's location and digital leadership. Examining this relationship can facilitate a better understanding of school leaders' challenges and opportunities in different settings.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to school location.

2.3. School Type

The type of school where a school leader works can significantly influence their digital leadership. "Private schools typically have more resources than public schools, making it easier for principals to implement new technology initiatives. Shabbir et al. (2014) and Ali, Ashraf, and Yasmin (2020) found that private schools have more access to digital media than public schools. The study by Race (2020) found that private schools' resources and funding allow them to invest in technology and infrastructure essential for online learning, such as computers, internet access, and online learning platforms. On the other hand, public schools often need more resources and funding than private schools, making it more difficult to implement online learning (Bernardo, Ganotice, & King, 2015). This is especially true for public schools in rural areas, which may need access to the same technology and infrastructure as public schools in urban areas but may have different resources and funding. Consequently, such findings would explain why private schools are more readily receptive to improvement, including technology adoption (Awan & Zia, 2015; Cote & Milliner, 2018). The digital divide between private and public schools is a significant challenge that needs to be addressed. It is crucial to find ways to bridge this divide so that all students have access to the same educational opportunities, regardless of the type of school they attend. The digital leadership of school leaders plays a critical role in bridging the digital divide and ensuring that all students have access to the same educational opportunities.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to school type.

2.4. Age Groups

Early research on leadership found that age is a significant socio-demographic factor influencing a leader's behavior (Bass & Stogdill, 1990; Stogdill, 1948). This finding has been confirmed by the recent study of Sürücü, Yeşilada, and Maşlakçı (2018) which found that age can be a significant predictor of leadership behavior. Additionally, Piaw and Ting (2014) found that age can predict a leader's thinking style, showing that older leaders are more task-oriented while younger leaders are more relationship-oriented. It is generally known that older leaders tend to have more experience and responsibility. However, this may not always be the case in rapidly changing technology-related organizations, where younger leaders may be more adaptable and able to embrace new technologies. Bass and Bass (2008) found that younger leaders are often preferred in these organizations because they are more likely to be comfortable with new information technology. Tanucan et al. (2021) found that age is positively correlated with success in implementing digital modules, with young individuals perceived to have higher digital literacy than older individuals. Heponiemi et al. (2022) noted that it is essential to identify more thoroughly the interaction between age and digital competence, especially for services that integrate online or virtual tools, as this can significantly impact the success of these services. Hence, more informed leadership development programs may be designed by examining how age influences digital leadership.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to age.

2.5. Years of Service

Experience in leadership can lead to expertise in various aspects of leading, including digital leadership. A study by Macatuno-Nocom (2019) found that years of service are significantly correlated with the digital leadership practices of deans in various state universities and colleges in the Philippines. Digital leadership requires a deep understanding of digital technologies, the ability to adapt to new working methods, and the capacity to manage change and innovation. Experienced leaders have a greater understanding of the potential benefits of digital transformation and can reasonably address the challenges that come with it (Klus & Müller, 2021). They can also use data analytics to make better decisions (Jiang, 2021). Experienced leaders also have a strong understanding of organizational dynamics and are better equipped to create a culture of digital innovation (Antonopoulou, Halkiopoulos, Barlou, & Beligiannis, 2021). The study by Zacher, Rosing, and Frese (2011) also noted that leadership

is influenced by experience, maturity, and age. Therefore, it is essential to consider the experience of school leaders for various digital transformation initiatives.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to years of service.

2.6. Educational Attainment

Educational attainment is a crucial factor in digital leadership. Individuals with higher levels of education are more likely to have the necessary skills and knowledge to lead and manage technology integration in education effectively. A study by Voogt, Erstad, Dede, and Mishra (2013) found that digital transformation in education requires changes in school curricula and the overall culture of teaching and learning. Educational leaders can accomplish these changes by acquiring relevant knowledge and skills. Van Deursen (2020) also argued that those who are not digitally literate might need help navigating the digital age. Alenazi, Muenjohn, and McMurray (2017) found that educational background is leadership's most influential socio-demographic characteristic. This suggests that school leaders must be digitally literate to lead their schools effectively in the digital age. Educational leaders need the necessary skills and knowledge to lead and manage technology integration in education effectively.

Overall, the socio-demographic profile of school leaders is crucial for digital leadership. Previous scholarly works have attempted to provide evidence of the link between the socio-demographic profile of school leaders and some aspects of digital leadership. However, these studies have not yielded a unanimous finding on digital leadership in general. Further, more studies need to examine the socio-demographic determinants of Filipino school leaders' digital leadership, as studies about it are limited.

Hypothesis: There is a significant difference between school leaders' digital leadership with respect to educational attainment.

2.7. Statement of the Problem

This study examined the socio-demographic determinants (age, gender, years of service, educational attainment, location of school, and type of school) of Filipino school leaders' digital leadership. The objective of doing so was to advance the understanding of how digital leadership can be better introduced into the country's school system and how training can be organized for school leaders from various socio-demographic contexts.

3. METHODOLOGY

A cross-sectional research design was employed to gather data from 386 school leaders in the Philippines. The calculated minimum sample size of 377, as determined by Raosoft® software, is surpassed by this number, which is possible if the sample represents an unknown population (Raosoft, 2004). The respondents were selected using convenience sampling, as the survey invitation link was distributed through multiple social media platforms. This approach facilitated the widespread distribution of questionnaires during the pandemic, when opportunities for direct contact and social interaction were restricted. The questionnaire demonstrated high internal reliability, as indicated by a Cronbach's alpha coefficient of 0.89. Table 1 displays the socio-demographic characteristics of the participants.

As shown in Table 1, this study included respondents with a variety of socio-demographic characteristics. About half of the respondents were male (49.7%, n=192), while the other half were female (50.3%, n=194). The majority had served between 6 to 10 years (60.1%, n=232), followed by those with 1 to 5 years of service (19.4%, n=75) and those with over 11 years of service (20.5%, n=79). The educational attainment of the respondents ranged from Bachelor's to Doctorate degrees, with the majority holding a Master's degree (51.3%, n=198), followed by Bachelor's degree holders (28.5%, n=110) and Doctorate degree holders (20.2%, n=78). The participants' ages ranged from 25 to 64 years old, with 49.5% (n=191) falling in the 36-44 age bracket. Lastly, more respondents were from public schools (52.1%, n=201) than private schools (47.9%, n=185).

The ISTE standards for education leaders (International Society for Technology in Education, 2023) were used to evaluate school leaders' digital leadership skills. The ability to use technology to transform learning for all students

is defined as digital leadership. Digital leaders are educators who are visionary, collaborative, and innovative in their use of technology to create a more engaging and effective learning environment. They are the leaders who use technology to help schools prepare students for the challenges and opportunities of the twenty-first century.

Table 1. Socio-demographic profile of respondents (N = 386).

Socio-demographic variables	Frequency	Percent
Gender		
Male	192	49.7
Female	194	50.3
Years of service		
1-5 years	75	19.4
6-10 years	232	60.1
11 years and above	79	20.5
Highest educational attainment		
Bachelor's	110	28.5
Master's	198	51.3
Doctorate	78	20.2
Age groups		
25-35	75	19.4
36-44	191	49.5
45-54	63	16.3
55-64	57	14.8
School location		
Rural	90	23.3
Urban	296	76.7
School type		
Public	201	52.1
Private	185	47.9

The data collection procedure was divided into five stages: (1) Choosing a questionnaire. The questionnaire asked questions about digital leadership in five areas: equity and citizenship advocacy, visionary planning, empowering leadership, systems design, and connected learning. For internal consistency, the survey was pilot tested. The second section of the questionnaire asked about the socio-demographic profile of school leaders, including their age, gender, years of service, educational attainment, school location, and school type. (2) Questionnaire content validation. Three education experts reviewed the questionnaire to ensure that each item corresponded to the variables of the study. One English language expert reviewed and corrected any grammatical or sentence structure issues. Two school leaders verified that the items were relevant to digital leadership in education. (3) Questionnaire pilot testing. The questionnaire's pilot testing yielded a Cronbach's alpha rating of 0.89, indicating that it has high internal reliability consistency. (4) Questionnaire distribution. The survey was distributed through social media groups and institutional websites. (5) Screening of collected data. The collected data was screened to ensure its completeness and accuracy.

The IBM SPSS Statistics version 27.0 software was used to analyze the data collected in this study. The statistical significance level was set at $p < 0.05$. Frequency and percentage were used to present descriptive data. To assess group differences in the digital leadership variable, the independent t-test and one-way analysis of variance (ANOVA) were used. The ANOVA allows you to see if there is a significant difference between the means of three or more groups. If the F-test produces a significant result, indicating a significant difference between the group means, post-hoc tests such as Tukey's Honestly Significant Difference (HSD) are used to determine which specific pairs of means have significant differences. Tukey's HSD test is used within the ANOVA to provide additional information about the precise locations of significant differences between group means, allowing for more precise interpretations of the results.

4. RESULTS

This section presents a thorough analysis of the data, leading to answering the study's statement of the problem. It also displays simplified tabular representations of the data, which can be helpful for understanding the results. Table 2 shows the T-test of digital leadership based on gender, school location, and school type.

Table 2. The T-test of digital leadership based on gender, school location, and school type. (n=386)

Hypothesis	Variables	Categories	N	Mean	S.D.	T	p-value
1	Gender	Female	194	3.25	0.787	-5.751	< 0.01
		Male	192	3.63	0.497		
2	School location	Urban	296	3.60	0.593	8.852	< 0.01
		Rural	90	2.90	0.699		
3	School type	Public	201	3.27	0.785	-5.214	< 0.01
		Private	185	3.62	0.362		

Note: N= Number of sample; S.D= Standard deviation; T=T-value.

The t-test analysis presented in Table 2 indicated that male school leaders ($M = 3.63, SD = 0.497$) rated digital leadership significantly higher than female school leaders ($M = 3.25, SD = 0.787$), $t(384) = -5.751, p < .01$. Furthermore, school leaders from urban locations ($M = 3.60, SD = 0.593$) rated digital leadership significantly higher than their rural counterparts ($M = 2.90, SD = 0.699$), $t(384) = 8.852, p < .01$. Additionally, school leaders from private schools ($M = 3.62, SD = 0.362$) rated digital leadership significantly higher than those from public schools ($M = 3.27, SD = 0.785$), $t(384) = -5.214, p < .01$.

On the other hand, Table 3 shows the differences of digital leadership based on age groups, years of service, and educational attainment.

Table 3. The differences of digital leadership based on age groups, years of service, and educational attainment. (n=386)

Hypothesis	Variables	Categories	N	Mean	S.D.	F	p-value
4	Age groups	25-35	75	3.76	0.351	241.94	0.000
		36-44	191	3.82	0.287		
		45-54	63	2.76	0.506		
		55-64	57	2.47	0.623		
5	Years of service	1-5 years	75	3.76	0.351	102.163	0.000
		6-10 years	232	3.60	0.595		
		11 years and above	79	2.65	0.591		
6	Education attainment	Bachelors	110	3.57	0.494	246.756	0.000
		Masters	198	3.76	0.400		
		Doctorate	78	2.43	0.521		

Note: N=Number of sample; S.D=Standard deviation; T=T-value.

The one-way ANOVA results in Table 3 revealed significant differences in digital leadership across age groups [$F(3,382) = 241.94, p < .000$]. A post-hoc test using Tukey's HSD revealed a negative relationship between age and digital leadership, with younger age groups (25-35 and 36-44) scoring significantly higher in digital leadership compared to the older groups (45-54 and 55-64). Similarly, digital leadership significantly varied across years of service [$F(2,383) = 102.163, p < .000$]. A post-hoc test using Tukey's HSD found a negative relationship between years of service and digital leadership. The group with 11 years of service and above exhibited significantly lower levels of digital leadership compared to the 1-5 years and 6-10 years groups. However, no significant difference in digital leadership was observed between the 1-5 years and 6-10 years groups. Moreover, significant differences in digital leadership were observed across levels of educational attainment [$F(2,383) = 246.756, p < .000$]. A post-hoc test using Tukey's HSD revealed that school leaders with a Master's degree demonstrated the highest level of digital leadership, followed by those with a Bachelor's degree, and then Doctorate degree holders.

5. DISCUSSION

This study examined the socio-demographic determinants of Filipino school leaders' digital leadership. Specifically, it focused on the influence of age, gender, school location, school type, years of service, and educational attainment.

Comprehensive data analysis revealed that age is a determining factor in school leaders' digital leadership. This means that younger school leaders (44 years old and below) are better equipped to lead schools in the digital age. This finding supports previous studies that found younger leaders more likely to be familiar with digital technologies and use them to support student learning (Tanucan et al., 2021). They were also more likely to be comfortable with computers and information technology (Bass & Bass, 2008) especially for services that integrate online or virtual tools (Heponiemi et al., 2022). Younger school leaders who are familiar with digital technologies are better equipped to integrate digital technologies into the classroom in effective and engaging ways for their stakeholders. This is because they have a deep understanding of how these technologies work and how they can be used to support education. They are also more likely to be able to identify the specific needs of their stakeholders and choose the right technologies to meet those needs.

However, while the study shows that younger school leaders tend to have stronger digital leadership skills, older school leaders can also be effective with technology if they are given the opportunity to learn new skills and adapt to the changing needs of students and parents (Chen, Chen, & Chen, 2010; Le, Tran, Le, and Le, 2021). One way to help them is by providing training on digital technologies. This training can involve helping them learn how to integrate digital technologies into their administrative and teaching tasks to manage their schools more effectively. It has been noted that older adults who received training on how to use computers and other digital devices were more likely to use them regularly and report benefits such as staying connected with friends and family, staying informed about current events, and learning new things (Neil-Sztramko, Coletta, Dobbins, & Marr, 2020; Slegers, Van Boxtel, & Jolles, 2008).

The study revealed that male gender significantly influences the digital leadership of school leaders ($M=3.63$, $SD=.497$). Male school leaders are more likely to possess superior digital leadership skills compared to their female counterparts ($M=3.25$, $SD=0.787$). This finding aligns with prior studies indicating that male school leaders are more inclined to assume digital leadership roles (Elechi, 2014) due to their higher perceived competence, comfort, and involvement with technology (Ashong & Commander, 2012). Males generally exhibit higher levels of confidence in computer-related activities, particularly in terms of their computing abilities (Broos & Roe, 2006; Meelissen & Drent, 2008). In contrast, females tend to display higher levels of anxiety, less experience, and lower levels of confidence in information and communication technologies (Sultan & Kanwal, 2017). Males tend to exhibit high computer self-efficacy, indicating their proficiency in computer usage (Awofala, Fatade, & Udeani, 2015; Sultan & Kanwal, 2017).

In general, our study found that male school leaders are more likely to have the skills and knowledge needed to lead in a digital age. Although several studies have backed this finding, it also shows that the gender gap in digital leadership exists (Rowntree, 2018; United Nations International Children's Emergency Fund, 2023). This gap may be due to several factors, including the lack of access to technology. The United Nations International Children's Emergency Fund (UNICEF) found that 90% of young women in low- and middle-income countries do not use the Internet. This is equivalent to about 65 million people (United Nations International Children's Emergency Fund, 2023). Rowntree (2018) found that roughly 327 million fewer women than men own smartphones and, consequently, mobile Internet access. In South Asia, the gap is even wider: Women are 26% less likely to own a basic mobile phone and 70% less likely to own a smartphone with internet access. In the Philippines, boys are more likely to use desktop computers than girls. This is likely because desktop computers are often used in internet cafes, typically male-dominated spaces (United Nations International Children's Emergency Fund, 2019). This lack of access to digital resources can have negative consequences, including employment opportunities and a lack of female technological role models.

In terms of school location, the study found that the urban location of schools is a determining factor in school leaders' digital leadership. This means that school leaders in urban schools ($M=3.60, SD=.593$) are more likely to be digital leaders than their rural counterparts ($M=2.90, SD=.699$). Urban locations have abundant access to various digital technology and digitalization initiatives, so promoting or utilizing digital leadership in these areas is more manageable. Karakose et al. (2021) noted that educational leaders in urban areas were typically provided with digital resources for their constituents, which are vital for aiding digital transformation and technology-based professional development in their schools. Additionally, many urban school professionals receive formal training on technology (Yentes, 2015) which is essential for school leaders to understand the latest educational technologies, integrate them into the classroom, and evaluate their effectiveness.

Although the studies above highlighted the advantages of leading schools in urban areas regarding digital leadership, they also point to the digital divide between urban and rural schools. This gap has been a pressing issue in many countries, as it can significantly impact various educational opportunities. People from poorer socioeconomic backgrounds (mainly in rural areas) tend to have limited access to internet connectivity, computers, mobile phones, practical information and communication technology skills, and active parental support (Azubuike, Adegboye, & Quadri, 2021; Freeman, Park, Middleton, & Allen, 2016; Salemink, Strijker, & Bosworth, 2017). The lack of equal access to information and communication technology-based learning negatively increases the differences in learning outcomes between students from different socioeconomic and geographic backgrounds (Rubagiza, Were, & Sutherland, 2011; United Nations, 2020). The digital divide is a significant issue that must be addressed. By providing more support for digital leadership in rural schools, the digital divide can be lessened, which will allow more schools to have the chance to prosper in the digital age.

In terms of school type, the study found that private school type ($M=3.62, SD=.362$) is a determining factor in school leaders' digital leadership, compared to public school type ($M=3.27, SD=.785$). This means that school leaders at privately-owned schools are more likely to have the skills, knowledge, and resources necessary to lead their schools in the digital age. Private schools typically have more resources than public schools, making it easier for school leaders to implement new technology initiatives. Shabbir et al. (2014) and Ali et al. (2020) indicated that private schools have more access to digital media than public schools. Additionally, private schools' financial resources and funding autonomy allow them to invest in technology and the digital infrastructure necessary for online learning (Race, 2020). Furthermore, private schools are more prepared to introduce improvements to the school, including adopting new technology for learning (Awan & Zia, 2015; Cote & Milliner, 2018). The gap between the resources available to private and public schools has been widening. Bridging this gap is essential to ensure that schools reap the benefits of using technology in education.

In terms of years of service, the study found that having shorter years of service (less than 10 years) is a determining factor in school leaders' digital leadership. This means that school leaders who have been in their positions for a shorter period are more likely to be engaged in digital leadership than those who have been in their positions for a more extended period. One explanation for this finding is that contemporary school leaders may be likely to be more familiar with digital technologies and willing to take risks and experiment with new technologies. Macatuno-Nocom (2019) posited that digital leadership requires a more profound comprehension of digital technologies and the capacity to manage change and innovation. Those still relatively new to their school leadership responsibilities, typically the new generation of leaders, adept with technology, could be more flexible in embracing new technologies that could aid and assist in their leadership functions. Digital leaders need to be able to adapt to change quickly (Petry, 2018) and studies show that people who are new to leadership positions often have these qualities (Tanucan et al., 2022). While the study found that contemporary school leaders are more likely to engage in digital leadership, more experienced leaders should still be supported in developing digital leadership skills. Digital leadership is an essential skill for school leaders in the 21st century (AlAjmi, 2022). By developing digital leadership

skills in school leaders, regardless of their years of service, schools can access a broader range of opportunities (Figueiredo, 2021).

In terms of years of educational attainment, the study found that having a master's degree ($M=3.76, SD=.400$) is a determining factor in school leaders' digital leadership compared to those with Bachelor's degree ($M=3.57, SD=.494$) and Doctorate degree ($M=2.43, SD=.521$). This means that school leaders with more education training are more likely to be effective digital leaders. Many studies have shown that people with higher levels of education are more likely to have the skills and knowledge to lead and manage technology integration in education effectively. A study by Voogt et al. (2013) found that digital transformation in education requires changes to school curricula and the overall culture of teaching and learning, which can be achieved when school leaders have the relevant knowledge and skills. Ren, Zhu, and Yang (2022) also found that adults with more education may be able to help children use technology in beneficial and purposeful ways. Alenazi et al. (2017) also noted that educational background is the socio-demographic characteristic influencing digital leadership the most. Side by side educational attainment, Liu and Zowghi (2022) and Saputra, Nugroho, Aisyah, and Karneli (2021) also noted that involvement in digital initiatives could foster better understanding and navigating skills in the latest trends and technologies, wherein master's degree holders are observed to be more exposed to.

6. CONCLUSION

This study focuses on the understudied domain of digital leadership in the Philippines, an area of growing importance given the country's school administrators' diverse digital capabilities. It emphasizes the critical need for in-depth research into the nature and importance of digital leadership in the Philippine educational landscape, focusing on how socio-demographic factors affect the adoption of digital leadership skills. The study's key finding is the combined influence of socio-demographic factors such as age, gender, school location, school type, years of service, and educational attainment on Filipino school leaders' digital leadership skills. Our findings suggest that younger male leaders, those working in urban or private schools, those who are new to their leadership roles, and those with higher educational qualifications are generally better at integrating technology into the educational process. The literature has noted that school leaders with such socio-demographic profiles are more likely to have the resources, skills, and knowledge to lead and manage technology integration in education effectively. They are also more likely to be surrounded by other school leaders who are using technology effectively, which can provide them with support and inspiration. Additionally, they are also more likely to be open to new ideas and change, which are essential qualities for leading in the digital age.

The study's findings have important implications for the development of digital leadership skills among Filipino school leaders. First, it suggests that the government and educational institutions should focus on providing additional training and support to older, female leaders, those working in rural and public schools, and those who are experienced leaders. This is to help close the inequity in digital leadership skills that exists between these groups and their younger, male, urban, private school, and newer leader counterparts. Second, it suggests that these leaders should be encouraged to network with other school leaders who are using technology effectively. This can provide them with support, inspiration, and new skills and ideas. Finally, it suggests that these leaders should be given the opportunity to experiment with new ideas and technologies. This will help them develop their own digital leadership skills and see how technology can be used to improve teaching and learning. In general, the study suggests that the government and educational institutions need to take a more proactive role in supporting the development of digital leadership skills among all school leaders, regardless of their socio-demographic background. This includes providing training and support, as well as creating a more supportive environment for digital leadership. Nevertheless, it is important to note study's findings are still preliminary, and further research is needed to confirm the findings and to explore the mechanisms by which socio-demographic factors influence the adoption of digital leadership skills.

7. RECOMMENDATIONS

The study's findings provide a valuable starting point for understanding the factors that influence digital leadership skills. By understanding the socio-demographic factors that can influence school leaders' digital leadership, professional development opportunities and other means of support for school leaders on technology in education can be designed and delivered more effectively. For example, this study has shown that older school leaders, including females, those in rural areas, those who have more experience, and those in public schools may need more support with improving their digital leadership. These school leaders can be effective in leading with technology if they are given the opportunity to participate in the professional development of digital technologies for their administrative and teaching tasks. Another way is to provide them with funding to purchase new equipment and upgrade existing ones. Additionally, provide technical assistance that can help them be proficient with setting up and maintaining computer networks, troubleshooting technical problems, and finding and evaluating educational software. Finally, building partnerships with governments, private organizations, and non-profit groups can help these school leaders access professional development opportunities and funding for digital infrastructure and technology that they would not otherwise be able to afford.

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