

The Impact of School Heads' Digital Leadership Competence and Readiness to Education 4.0 in Promoting Elementary Schools' Digital Transformation

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ABSTRACT: The school leadership holds a pivotal role in initiating and sustaining school reform. The digital world requires leaders who can motivate, adapt, and empower their people to use technology for innovation and growth. Thus, this study was designed to determine the impact of school heads' digital leadership competence and readiness to Education 4.0 in promoting elementary school's digital transformation. The researcher utilized a quantitative research design and a descriptive-correlational research method and was confined among public elementary school heads and teachers in Candelaria East and West District with 32 school heads and 609 teachers during the S.Y. 2024-2025. The result of the Multiple Regression Analysis identifies Innovation Management competence and Curriculum Innovation readiness as the most critical factors driving digital transformation in elementary schools, while Technological Competence provides additional but weaker contributions. These factors, significantly predict the schools' digital transformation. Digital Communication Skills presents a negative relationship with digital transformation.

KEYWORDS: Digital Leadership, Digital Transformation, Education 4.0, School Heads Technology Leadership

1. INTRODUCTION

Technology has transformed the citizens' lives. The global trend toward digitalization is causing a shift in the style of digital learning. In the period of contemporary information technology, technological products have had a significant impact on student learning, teacher preparation, and school operations. The capacity of school administrators to successfully use digital tools and technologies to improve teaching and learning is referred to in this context as "digital leadership." This is a skill that is becoming more and more valued.

Education is a dynamic and innovative process. Throughout history, it has been influenced by numerous social and scientific advances, as well as changed and innovated, resulting in its current form. The relevance of developing a training plan to improve educational institutions' efficacy and defining the essential tactics for implementing those plans grows by the day. The established education plans are anticipated to help to ensure the long-term development of schools. It is vital to manage, change, and improve organizational settings, participate in decision-making, and develop learning and teaching methodologies by assessing organizational culture effectively. School leaders bear the most responsibility in this regard. Developing vision and mission, preparing and implementing school development plans and strategies, improving organizational climate, creating communities that feel a sense of belonging to the institution, keeping communication channels open, increasing and ensuring coordination, developing critical thinking skills, being innovative, and managing change are the most important competencies expected from school leaders in the twenty-first century (Cetin & Karsantik, 2022).

The Fourth Industrial Revolution, often known as Industry 4.0, is the result of technological advancements. Innovative technologies have quickly revolutionized life's social, economic, ecological, and cultural dimensions and facets. The similar thing happened in the education ecosystem, where Education 4.0 was created to satisfy these new criteria while remaining relevant and effective in a constantly changing environment. It is primarily the digital transformation of school units that is required to supply vital materials to future pupils (Kin & Kareem, 2019).

The role of principals is critical in the reform of schools. They are expected to reconcile external needs with the primary need for school reform and transformation, particularly in learning and teaching processes, thereby moving the crucial factor of effective leadership from thinking capacity to action ability (Kin & Kareem, 2019). Given that school leadership is a significant predictor of effective change and adaptation in Education 4.0, it is crucial to define and create new competencies for school leaders who will guide this educational revolution. Without significant advocacy from educational technology leaders, the field of education would struggle to properly integrate technology into a school system, local school site, or classroom. Thus, in order to gain the benefits

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of technology, expert individuals must take on leadership roles and advocate its use for educational purposes.

According to Aksal (2015), school leaders face limited opportunity to apply digital leadership in their schools due to a variety of restrictions. These include limited professional development and training time, rigid curricula, a lack of technology infrastructure, and financial limits for upgrading existing technology infrastructure. Following the COVID-19 epidemic, it is critical to emphasize digital investments in teachers, students, and parents (Suphacicco, 2022).

As school leaders, they must realize the need for new skills to drive the digital revolution of education, particularly in the context of Education 4.0. The Fourth Industrial Revolution has resulted from technological advancements, transforming various elements of life. Education 4.0 is a digital transformation of educational units that necessitates competent leadership to match external demands with the core requirement for school reform and change. By developing these new skills, school principals may play an important role in promoting technology for educational objectives.

Given the preceding statement, the researcher opted to pursue a more in-depth knowledge and study that attempts to investigate the unique role of school principals in the digital transformation of schools. This study investigated how school leaders' digital leadership competencies and readiness to Education 4.0 affect the digital transformation of their schools. It is critical in the community, particularly in the Candelaria area, to conduct a more thorough examination into school leaders' digital leadership competencies and preparation for Education 4.0 in supporting elementary schools' digital transformation. This is required to build appropriate systems and procedures as input to digitalization practices in schools in the age of Education 4.0.

2. Statement of the Problem

The purpose of this study was to investigate the impact of School Heads' Digital Leadership Competence and Readiness to Education 4.0 on promoting Elementary Schools' Digital Transformation.

Specifically, this sought to answer the following questions:

1. To what extent is the school heads' competence with regards to digital leadership be described in terms of:
 - a. Visionary leadership;
 - b. Technological competence;
 - c. Innovation management; and
 - d. Digital communication skills?
2. To what extent is the school heads' readiness to Education 4.0 be described in terms of:
 - a. Adoption of emerging technologies (e.g., AI, VR, AR);
 - b. Curriculum innovation;
 - c. Personalized learning approaches; and
 - d. Collaboration and networking?
3. What is the level of elementary schools' digital transformation be described in terms of:
 - a. Integration of digital tools in teaching;
 - b. Digital infrastructure development;
 - c. Teacher training and professional development; and
 - d. Student engagement with digital learning?
4. Is there a significant difference between the perception of school heads and teachers when it comes to:
 - a. School heads' digital leadership;
 - b. School heads readiness to Education 4.0; and
 - c. Schools' digital transformation?
5. Is there a significant relationship between the school heads' digital leadership competence and elementary schools' digital transformation?
6. Is there a significant relationship between the school head's readiness to Education 4.0 and elementary school's digital transformation?

3. METHODOLOGY

The researcher utilized a quantitative research design and a descriptive-correlational research method. It is a fact-finding investigation with adequate and correct interpretation. This is used to collect data on the school head's level of digital leadership, readiness to Education 4.0 and their impact on elementary schools' digital transformation. The study used quantitative research to analyze and interpret the predictor and criterion variables. All data were analyzed, organized, and interpreted using descriptive and inferential statistics. This is the most appropriate method for this type of research.

This study focused on public elementary school heads and teachers in the Candelaria East and West Districts in Candelaria, Quezon. The number of respondents was predetermined and selected through stratified random sampling. This strategy divides the entire population into homogeneous groupings known as strata. Then, random samples were drawn from each stratum. A total of

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32 elementary school heads and 609 teachers became the respondents of the study.

The researcher's survey questionnaire was the primary tool used in gathering the needed data. The instrument was organized into four sections. The breakdown is as follows:

Part I. This section determines the extent is the level of school heads' competence with regards to digital leadership domains such as visionary leadership, technological competence, innovation management, and digital communication skills. This part is consisting of 20 items to which respondents will answer on a scale of 5 – Fully Demonstrated, 4 – Significantly Demonstrated, 3 – Somehow Demonstrated, 2 – Minimally Demonstrated, 1 – Not Demonstrated.

Part II. This part assesses the school head's readiness to Education 4.0 when it comes to adoption of emerging technologies (e.g., AI, VR, AR), curriculum innovation, personalized learning approaches, and collaboration and networking. This part has 20 items to which respondents will respond on a scale of 5 – Fully Demonstrated, 4 – Significantly Demonstrated, 3 – Somehow Demonstrated, 2 – Minimally Demonstrated, 1 – Not Demonstrated.

Part III. This portion of the questionnaire evaluates the level of school's digital transformation through getting the perception of the respondents when it comes to their school's integration of digital tools in teaching, digital infrastructure development, teacher training and professional development, and student engagement with digital learning. This has 20 items to which respondents will reply on a scale of 5 – Always Observed, 4 – Often Observed, 3 – Sometimes Observed, 2 - Rarely Observed, and 1–Never Observed.

The researcher underwent the following step-by-step procedures:

First, the researcher sought the panel experts' approval to conduct the study and hoped to defend the concepts successfully.

Second, the researcher prepared a letter for the school's division superintendent, district supervisors, principals, and school heads, requesting their authorization to conduct the study in their respective schools. After the school administrators' approval, the researcher finally conducted the study. The questionnaires and letters to the respondents were created and disseminated by the researcher via Google Forms through Messenger to quickly distribute and retrieve the instruments. The researcher retrieved the instrument thereafter.

Subsequently, the researcher gathered the data from the online survey. After gathering the data, the researcher managed and analyzed it thoroughly. The data generated from the Google form were summarized and organized before being submitted to the statistician. The statistician thereafter treated the data and guided the researcher in constructing the tables for presentation.

Honesty in reporting is an ethical standard for conducting the study. The researcher ensured the confidentiality of the respondent's information.

To assess the validity of the content, the researcher submitted the survey instrument to his adviser and other panel members for corrections and suggestions for its enhancement to ensure the accuracy of the questionnaire. To examine the reliability, a pilot testing was conducted to 20 teachers before the actual study. After pilot testing, the researcher used Cronbach's Alpha to measure the instrument's internal consistency.

Data about the digital leadership competence of school heads, school head's readiness to Education 4.0, and the level of school's digital transformation were gathered using the combined self-made questionnaire and other online sources. Responses were measured using a 5-point Likert Scale. It was analyzed and interpreted using Mean, Standard Deviation, and their Verbal Interpretation.

For inferential statistics, Analysis of Variance (ANOVA) was used to determine if there is significant difference between the responses of the 2 sets of respondents: the school heads and teachers.

Pearson r was utilized to determine the correlation between variables. To determine the strength of the association, Cohen's (1988) Interpretation of the r-values was employed.

For the regression analysis, Multiple Linear Regression Analysis was used to determine the strength of the variables. It is a statistical technique used to predict the value of a continuous dependent variable based on the values of two or more independent variables often called "predictors".

RESULTS AND DISCUSSION

PART I. SCHOOL HEAD'S DIGITAL LEADERSHIP COMPETENCE

Table 1

Level of School Heads' Digital Leadership in Terms of Visionary Leadership

Statements	Mean	SD	Verbal Interpretation
The school head...			
promotes the participation of school stakeholders in the technology planning process of school.	4.14	.826	Significantly Demonstrated
aligns the school technology plan with other plans, including district strategic plans,	4.55	.817	Fully Demonstrated

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school improvement plans and other instructional plans.

leads the implementation of a shared vision for comprehensive integration of technology to promote excellence. 4.09 .800 Significantly Demonstrated

evaluates progress, makes course corrections, measures impact of technology to transform learning. 4.15 .749 Significantly Demonstrated

includes a wide range of perspectives to sustain a vision for digitalization to advance student learning and success. 4.12 .813 Significantly Demonstrated

OVERALL 4.21 .738 Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated

1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

Table 1 reveals the extent to which school heads' competence in digital leadership is described in terms of Visionary Leadership. This table shows that the 32 school heads of Candelaria East and West District frequently communicate information about their school's technology planning and implementation efforts to their school's stakeholders, demonstrating their vision and leadership for technology usage and expansion in school, with a verbal interpretation of "Significantly Demonstrated" and a general mean score of 4.21.

It shows that school leaders are capable of supporting and directing the school on its current route while also establishing a vision for future development. Education leaders can collaborate with teachers and the community to plan a learning environment that prepares students for a constantly changing world. It demonstrates that school leaders consistently participate in the development and implementation of a forward-thinking vision. This implies that they are lobbying for policies, initiatives, and financial opportunities that will help schools implement their technology plans. They always include significant technology-related initiatives and plans in their vision sharing and in crafting their School Improvement Plan (SIP), Annual Improvement Plan's (AIP) Programs, Projects, and Activities (PPAs), Learning Continuity Plans (LCPs), and in their ways forward.

The highest indicator that states that the school administrators or principals always aligns the school technology plan with other plans, including district strategic plans, school improvement plans, and other instructional plans got a verbal interpretation of "Fully Demonstrated," as it accumulated a mean score of 4.55.

The Department of Education is committed to accelerate the delivery of basic education facilities and services. The office announced the launching of the DepEd Digital Education 2028 or "DepEd DigiEd 2028" last January 2024. And since the school heads in Candelaria East are one with DepEd's mission in addressing the challenges in digital learning and education technology, they always aligned their technology plans with their school plans. Some of these technology plans are upskilling the teachers through training and workshops with ICT-assisted teaching that aims to provide teachers with equipment, software content, and skills for their daily classroom teaching; and optimizing the use of technology while ensuring its responsible and ethical use, especially with the world exploring Artificial Intelligence in both teaching and learning. It shows that the school heads' alignment of their technology plans is not just present or partially done, but is consistently, comprehensively, and effectively carried out. It implies a high level of integration and coherence between the technology plan and the broader strategic and instructional goals of the school, district and the DepEd Central Office.

In the locale, some of the technology planning processes attended and organized by the school heads were manifested in their yearly Office Performance Commitment and Review Form (OPCRF), included in their 3-year School Improvement Plan (SIP), Annual Implementation Plan (AIP) PPAs, and are aligned with the SDO Quezon's Project KALILAYAN and DepEd's newly laid-out 5-point Agenda. This constitutes different programs and projects related to technology improvement and competency enhancement of teachers and school heads.

According to Woods and Roberts (2019), Visionary Leadership in the education era emphasizes the importance of the principal's role as an educational leader in looking ahead and seizing future opportunities, which include the ability to think critically, collaborate, communicate, be creative in all global connections, and use technology and learning tools (Huma et al. 2023). Furthermore, Visionary Leadership communicates the path of future development to organizational members, motivating followers to incorporate the leader into themselves and become more proactive at work (Liu, 2022). Thus, it is an effective technique for preparing for resilience, tolerance, and innovative ideas that create room for new advances and meet educational aims and objectives (Kadir et al., 2020).

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Table 2

Level of School Heads' Digital Leadership in Terms of Technological Competence

Statements	Mean	SD	Verbal Interpretation
The school head... uses integrated technology-based management and operations systems.	4.19	.831	Significantly Demonstrated
sets goals to remain current on emerging technologies for learning, innovations in pedagogy and advancements.	4.23	.834	Significantly Demonstrated
participates regularly in online professional learning networks to collaboratively learn with and mentor other professionals.	4.12	.861	Significantly Demonstrated
uses technology to regularly engage in reflective practices that support personal and professional growth.	4.20	.820	Significantly Demonstrated
stays abreast of educational research and emerging trends regarding effective use of technology	4.11	.847	Significantly Demonstrated
OVERALL	4.17	.751	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated
1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

Table 2 indicates the level of school heads' proficiency with regards to digital leadership be described in terms of Technological Competence.

As shown in the table, the degree of the school leaders' knowledge in the use technology to engage in regular reflective activities that promote personal and professional development is often observed and was described as "Significantly Demonstrated" and got an overall mean of 4.17. It means that school leaders effectively use technology for school management and operations. They proactively set goals to stay current with new educational technologies, teaching methods, and advancements. These leaders regularly engage in online professional learning networks to collaborate with and mentor other educators. Furthermore, they continuously keep up-to-date with educational research and emerging trends on how to use technology in schools best.

The school heads evidently set goals to remain current on emerging technologies for learning, innovations in pedagogy, and advancements, which means it is "Significantly Demonstrated" with the highest mean score of 4.23. This is evident since they are articulating a forward-thinking vision for how technology and innovative pedagogies will transform learning within their school. This vision isn't just about tools but about enhancing student learning outcomes and preparing students for the future. Some of the school heads collaboratively create detailed strategic plans that outline how technology will be integrated into the curriculum, instruction, and administrative processes as well. This includes setting specific, measurable goals related to technology adoption, professional development, and student skill development.

In Candelaria, school heads encourage the teachers to join in the different trainings that will enhance their technology skills such as the Google for Education series of trainings and workshop especially now in the era of the Artificial Intelligence. This might be because school heads in Candelaria Districts believe that in an evolving educational landscape, schools that embrace innovation are often perceived as progressive and attractive to parents and students. School heads understand that staying current helps their institutions remain competitive and at the forefront of educational best practices. The modern world is increasingly driven by technology. School heads recognize that students need to be equipped with digital literacy, critical thinking, problem-solving, and collaboration skills, which are often fostered through the effective use of technology and innovative pedagogies.

Digitalization will provide challenges to future leadership practices. To effectively manage their teams in the future, leaders must grasp how to stay up with the rising obstacles brought on by the digital age. The most successful digital transition begins with a shift in leaders' attitudes, which they must anticipate (Kane, 2019). Digital leadership enables institutions to attain the best teamwork and management practices, both of which are critical for the growth of global high-tech educational practices among instructors (Temelkova, 2018).

According to Sheninger (2014), some school administrators are still hesitant to adopt digital technologies, such as social media, and misunderstand the benefits of using digital gadgets. Some principals lack ICT and digital technology competencies. According to Leong et al. (2016), there is a link between principals' understanding of technology integration and their ability to drive themselves to adopt whole-school improvements. Van Niekerk and Van Wyk (2014) further claim that it is the principal's responsibility to initiate and sustain the integrated use of technology in education by modeling and implementing technology into daily management and administrative activities. Karahan et al. (2015) found that school administrators must adapt to technological developments, as these developments will continue to occur.

Table 3 illustrates the school heads' digital leadership competence as described in their Innovation Management.

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As shown in the table above, it has been revealed that the respondents' perception of the level of school heads' digital leadership in terms of Innovation Management is "Significantly Demonstrated" as it gained a total mean score of 4.21. The statement with the highest mean of 4.28 stated that most school heads ensure all students learn from educators who are skilled in using technology to create authentic and engaging learning experiences. It was interpreted as "Significantly Demonstrated."

Table 3
Level of School Heads' Digital Leadership in Terms of Innovation Management

	Mean	SD	Verbal Interpretation
The school head...			
guides teams to establish equitable technology policies that support effective learning.	4.20	.821	Significantly Demonstrated
ensures equitable access to appropriate digital tools and resources to meet the needs of all learners	4.24	.822	Significantly Demonstrated
ensures all students learn from educators who are skilled in using technology to create authentic and engaging learning experiences.	4.28	.871	Significantly Demonstrated
creates, promotes, and sustains a dynamic digital age learning culture that provides a rigorous, relevant, and engaging education for all students.	4.17	.834	Significantly Demonstrated
ensures that resources and infrastructure for supporting effective use of technology for learning are sufficient to meet future demand.	4.17	.865	Significantly Demonstrated
OVERALL	4.21	.788	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated
1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

In general, the results show that elementary school principals in Candelaria play a key role in ensuring equitable and effective technology innovation within their schools. They guide teams in ensuring fair technology policies that support learning for everyone. This includes making sure all students have equal access to the right digital tools and resources.

While a single, all-encompassing "equitable technology policy" document might not be explicitly named, DepEd's commitment to equity in technology use for education is evident through various programs, guidelines, and pronouncements. One of these policies that school heads follow and adhere is the DepEd Computerization Program (DCP) which is the most direct policy for equitable access. Its primary goal is to provide public schools with appropriate, quality, and equitable technologies. Another is the implementation of RA 11650 (Inclusive Education for Learners with Disabilities) which underscore the use of assistive technologies and accessible digital content. This ensures that technology serves as an enabler, not a barrier, for students with diverse learning needs. One more policy is the provision of the Professional Development Programs for Teachers that equip teachers with the necessary skills to integrate technology effectively into their teaching practices and train teachers to use technology to support learner-centered approaches, personalized learning, and 21st-century skills development. DepEd also provides schools with Learning Resources Management and Development System (LRMDS) is designed to be a repository of quality-assured digital learning resources. Principals are responsible for fostering a stimulating and current digital learning environment that offers a challenging, relevant, and engaging education for every student. Finally, they ensure there are enough resources and infrastructure to effectively support the use of technology for learning, even as needs evolve.

According to Dogan (2017), innovation is a "strategic choice" that leads to organizational progress. Because the school administrator is the highest-ranking official in the school, they are responsible for establishing the vision and creating an environment in which each team member can freely express their creativity. If the manager does not own innovation, it cannot occur in the school. Above all, the principal's inventive approach persuades people that they can accomplish things they previously thought were impossible.

The most important issue in managing modern schools in an innovation environment is transforming the traditional school into a novel educational institution through the implementation of development techniques. The administrator's knowledge, capability, and abilities are solely responsible for the school's performance. In public schools in development, innovation processes are managed. Several potential advances in school management have been documented. For example, administrators can adopt "process innovation" (new service delivery), "organizational innovation" (new organizational approach), and "incremental innovation" (gradual modifications to existing structure) in schools (Akpan, 2016).

Table 4
Level of School Heads' Digital Leadership in Terms of Digital Communication Skills

The Impact of School Heads' Digital Leadership Competence and Readiness to Education 4.0 in Promoting Elementary Schools' Digital Transformation

Statements	Mean	SD	Verbal Interpretation
The school head... communicates clearly and concisely through digital channels.	4.30	.799	Significantly Demonstrated
utilizes digital tools to enhance communication and collaboration within the school community.	4.34	.735	Significantly Demonstrated
regularly sends out digital newsletters, advisories, memos and updates to keep the community informed.	4.39	.827	Significantly Demonstrated
actively listens to feedback concerns expressed through digital platforms.	4.32	.805	Significantly Demonstrated
promotes digital citizenship and responsible online behavior.	4.24	.825	Significantly Demonstrated
OVERALL	4.32	.713	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated 1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

Table 4 above presents the findings on how well school heads demonstrate Digital Communication Skills as leaders.

This indicates that school heads consistently demonstrate strong digital communication skills in their leadership, as evidenced by a total mean score of 4.32, which is interpreted as "Significantly Demonstrated". This indicates that school heads demonstrate digital leadership through their strong digital communication skills. They effectively communicate clearly and concisely using various digital channels. They also leverage digital tools to improve communication and collaboration throughout the school. School heads consistently send out digital newsletters, advisories, memos, and updates to keep everyone informed, and they actively listen to feedback and concerns shared on digital platforms. Moreover, they promote digital citizenship and responsible online behavior within the school community. Most of the school heads lead the creation and enforcement of comprehensive policies for internet and digital devices within their school. These policies clearly outline what is and isn't allowed, addressing issues like online safety, cyber bullying, netiquette and copyright and plagiarism. As such, school heads also advocate for and oversee the integration of digital citizenship education across various subjects and grade levels. They ensure that students are taught how to critically evaluate online information, identify fake news, understand bias, and verify sources. By taking a comprehensive and proactive approach that integrates policy, curriculum, professional development, and community engagement, school heads effectively promote digital citizenship and responsible online behavior, preparing students to be safe, ethical, and empowered participants in the digital world.

The school heads regularly send out digital newsletters, advisories, memos, and updates to keep the community informed, as it was described as "Significantly Demonstrated" because it received the highest mean of 4.39. Meanwhile, the indicator that tells school heads to promote digital citizenship and responsible online behavior received the lowest mean of 4.24. Yet, it also fell to the descriptive level of "Significantly Demonstrated."

Accordingly, digital communication entails the exchange of information between communication partners in a digital environment. Means of communication can be defined as the various technologies that facilitate people's ability to communicate. Given their interactions with public stakeholders such as parents, legislators, and the community, principals must have a personal interest in technology as a communication tool. Principals play a crucial role in shaping the school's vision for how technology is utilized in teaching and learning, given their position of authority and community involvement.

According to Afzaal (2017), school principals must possess basic computer skills to perform administrative and managerial tasks at their schools. Principals must maintain continuous communication with teachers, students, parents, Boards of Management (BoMs), the Ministry of Education (MoE), the Teachers Service Commission (TSC), school vendors, and other key stakeholders to manage and lead their schools effectively. Ghavifekr, Afshari, Siraj, and Seger (2016) found that using email to notify instructors of meetings, deliver memos, and distribute critical internal and national policy documents had various advantages.

On the other hand, due to the rapid changes in technology, school leaders must develop their digital literacy skills and implement innovative applications to ensure the safe and appropriate use of technology (Ribble & Miller, 2013). If school leaders recognize and are aware of the importance of digital citizenship and responsible online behavior, they can craft school policies regarding the proper and responsible use of digital media. Through this, students, under the guidance of their teachers, may be less affected by the harmful effects of technology addiction in the 21st century. For this reason, it is understood that educational leaders should provide digital leadership to students, enabling them to develop their digital citizenship skills within educational environments.

Table 5
Summary Table of the Level of School Heads' Digital Leadership

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Statements	Mean	SD	Verbal Interpretation
Visionary Leadership	4.21	.738	High
Technological Competence	4.17	.751	High
Innovation Management	4.21	.788	High
Digital Communication Skills	4.32	.713	High
OVERALL	4.23	.709	High

Legend: 4.50-5.00 – Very High 3.50-4.49 – High 2.50-3.49 – Moderately High/Low 1.50-2.49 – Low 1.00-1.49 – Very Low

The summary table above presents the results of the 32 school heads' digital leadership expertise and their level of performance in using technology for school management.

In Candelaria East and West Districts, school heads are demonstrating strong digital leadership, consistently practicing all four key competencies identified. Their overall average score of 4.23, interpreted as "High," indicates regular and observable digital leadership practices. Specifically, Digital Communication Skills stood out with the highest average score of 4.32, also interpreted as "High." While Technological Competence had the lowest average among the four at 4.17, it too was interpreted as "High." These are encouraging results, showing that school heads are performing well as technology leaders. However, there's still an opportunity for them to further enhance their digital leadership skills and reach a "Very High" level of competence.

As stated by Meng et al. (2023), digital leadership in education is a multidimensional skill with important implications for the modern educational landscape. It reflects a leadership style that focuses on achieving digital transformation within educational organizations, thereby influencing the future of learning and administration.

According to research, educational institution heads and leaders should demonstrate how to use technology to inspire subordinates to adopt it in their daily administrative and professional obligations (Hamzah et al., 2021). A technology or digital leader must understand how to utilize technology to enhance teaching, develop techniques to help teachers integrate technology into their instruction, and establish a technology team and support structure to encourage an organization's adoption of new technology consistently. A school principal's significant responsibilities include developing and implementing innovative technology techniques, assisting teachers in recognizing and understanding the value of integrating technology into teaching and instruction, and utilizing technology to enhance curriculum and instruction effectiveness. A school principal must also use leadership skills to encourage teachers and non-teaching staff to pursue training to improve their information technology skills, develop skills in using technology in administration and teaching, create a communal and supportive school environment, and improve school administration, teaching, and student learning and performance.

PART II. SCHOOL HEAD'S READINESS FOR EDUCATION 4.0.

Table 6

Level of School Heads' Adoption of Emerging Technologies (e.g., AI, VR, AR)

Statements	Mean	SD	Verbal Interpretation
The school head...			
explores and experiments with new educational technologies (e.g., AI tools, VR/AR, data analytics platforms).	3.45	.846	Sometimes Demonstrated
uses Management Information System (MIS) or various data systems to gather, organize, and store data for reporting purposes.	4.09	.900	Significantly Demonstrated
utilizes AI-powered tools (e.g., note-taking apps, scheduling tools) to enhance personal productivity and efficiency.	4.04	.903	Significantly Demonstrated
utilizes emerging communication tools (e.g., video conferencing, instant messaging, project management software) for personal and professional tasks.	4.67	.909	Fully Demonstrated
seeks out and engages in professional development related to emerging technologies in education (e.g., webinars, online courses, conferences).	4.33	.808	Significantly Demonstrated
OVERALL	4.12	.788	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated 1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

Table 6 presents a summary of ratings for the extent to which school heads are ready to adopt emerging technologies (e.g., AI, VR, AR).

Data show that the readiness of elementary school principals in Candelaria, Quezon, regarding the acceptance of emerging technologies, has been described as "Significantly Demonstrated" due to its accrued average mean rating of 4.12. Survey results reveal a significant willingness and readiness among school leaders in most indicators.

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The highest indicator suggests that school heads often or frequently utilize emerging communication tools, such as video conferencing, instant messaging, and project management software, for both personal and professional tasks. This interpretation was categorized as “Fully Demonstrated” due to a mean score of 4.67. In a related study, Bond et al. (2018) discovered that ICT skills are becoming increasingly important in the workplace, making digitalization in higher education (HE) a vital issue. Kimena's (2022) study also revealed a link between social media and school leadership, with WhatsApp being the most widely used medium, followed by Facebook, Zoom, Google Meet, and Google Classrooms. These findings supported the use and influence of digital media technologies in school leadership.

On the other hand, the statement that says school heads explore and experiment with new educational technologies, such as AI tools, VR/AR, and data analytics platforms, was recorded as “Sometimes Demonstrated.” It got the lowest mean of 3.45. According to Ugur & Koc (2019), while principals may be willing to implement technology, they require more customized professional development to facilitate effective implementation. It also states that administrative training courses do not teach school principals or central office administrators how to use technology effectively.

The result is similar with the study of Apsorn et al. (2019) in Thailand, the majority of educational technology difficulties are attributed to administrators' reluctance to utilize information technology. Administrators are still unprepared to master new technologies, and they do not see the importance of innovation and information technology. Administrators often lack the expertise, experience, and aptitude required to build innovative media and information technologies, as well as other aspects of teaching and learning that utilize media. Furthermore, the majority of school administrators continue to lack ICT leadership abilities, posing a substantial challenge to educational administration and management at both the school and national levels.

Although there are still areas of unreadiness, this result still proves that the school leaders in Candelaria significantly demonstrate readiness in using different emerging technologies. They utilize a Management Information System (MIS) or other data systems to collect, organize, and store data for reporting. The school leaders also utilize AI-powered tools, such as note-taking apps and scheduling tools, to enhance personal work efficiency and productivity. They seek out and participate in growth opportunities related to emerging technologies in education through webinars, online courses, and conferences.

In today's educational landscape, schools worldwide are transitioning to hybrid learning environments. This transition, triggered by the pandemic, has underlined the critical importance of digital technology tools in supporting the educational system, as well as the necessity for innovative school leadership in the post-pandemic period. School principals now have access to a wealth of data and computing capacity that was previously unavailable due to the greater integration of technology into teaching, learning, and educator-student interactions (Sorensen, 2019). Consequently, the integration of digital technological tools is a defining feature of the current and future learning and leadership landscape. In the post-pandemic era, high school administrators must stay current on digital innovations as the world adjusts. According to Okunlola et al. (2024), the pandemic has created new responsibilities for digital leaders, and the post-pandemic period will impose even more digital tasks and obligations on school leaders. Digital leaders must stay current with the evolving tools of the digital revolution to promote growth and development in the educational environment.

The advent of digital technology has led to an unprecedented number of digital tools available to school leaders for use in their various responsibilities. School administrators may be embracing it because social media provides a wealth of free resources.

Table 7
Level of School Heads' Curriculum Innovation

Statements	Mean	SD	Verbal Interpretation
The school head...			
utilizes online platforms (e.g., Google Docs, shared drives) for collaborative curriculum development among teachers.	4.29	.832	Significantly Demonstrated
implements personalized learning platforms that utilize technology to adapt instruction to individual student needs and learning styles.	4.18	.856	Significantly Demonstrated
encourages and supports the use of innovative teaching practices that effectively integrate technology (e.g., blended learning, flipped classrooms, gamification).	4.26	.808	Significantly Demonstrated
evaluates emerging technologies with potential for curriculum innovation (e.g., AI-powered learning tools, VR/AR).	4.09	.841	Significantly Demonstrated
stays informed about the latest trends and innovations in educational technology.	4.22	.835	Significantly Demonstrated
OVERALL	4.21	.773	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated
1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

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Table 7 presents the survey results regarding the readiness of school heads in Education 4.0 in terms of Curriculum Innovation. This survey has revealed that a significant number of school heads often promote and encourage innovative teaching techniques that successfully integrate technology. This means that the principals ensure that technology resources are allocated fairly and follow the needs of students and teachers. This area received an overall verbal interpretation of “Significantly Demonstrated” as it accumulated a mean rating of 4.21.

School heads habitually utilize online platforms, such as Google Docs and shared drives, for collaborative curriculum development among teachers. It was significantly recorded as “Significantly Demonstrated” and got the highest mean of 4.29. Meanwhile, a survey on the school heads' initiative to evaluate emerging technologies with potential for curriculum innovation, such as AI-powered learning tools and VR/AR, was also conducted and was described as “significantly demonstrated.” However, it received the lowest mean score of 4.09.

The school is about to face the task of fully integrating and embracing technological advancements. Principals and instructors must prepare how they will accept, integrate, and use technology in the classroom, as well as equip themselves with the most recent technological developments. A principal's responsibility is to encourage instructors to use and incorporate technology into the learning process. Teachers, as front-line educators, should actively welcome the use of technology in the classroom. They must be capable of adopting technology into classroom education while considering it as pedagogical innovation (Cantos & Callo, 2022). School principals, as educational leaders, play a critical role in driving institutional change and fostering innovation, depending on leadership theories such as transformational and distributed leadership. They are responsible for designing Education 4.0-compatible learning environments, mobilizing resources, and empowering teachers to implement changes. Çetin and Karsantik (2022) emphasize the significance of teachers' leadership in instructional design, curriculum development, and technology integration to optimize the benefits of Education 4.0 in classrooms.

School teachers are increasingly encouraged to use digital resources in the classroom. Furthermore, educators are being encouraged to reassess curricular revisions to better prepare students for the future. According to Tupas and Noderama (2020), DepEd officials are advised to begin incorporating Education 4.0 into In-Service Training. Many schools are currently considering or implementing school reforms in response to the increasing demand for excellent education and accountability. However, without teacher buy-in or approval, most of these school improvements are likely to fail (Tai et al., 2022). In the context of Education 4.0, school leadership can be defined broadly as strategic leadership.

Furthermore, the growing desire for school improvements in the era of Education 4.0 puts school administrators' positions under constant scrutiny. As schools continue to implement school effectiveness programs, it is imperative that school leaders prepare themselves and be ready with the essential competencies to effectively lead sustainable schools in the Era of Education 4.0 (Ghouri, 2020).

Table 8
Level of School Heads' Personalized Learning Approaches

Statements	Mean	SD	Verbal Interpretation
The school head...			
creates flexible learning environments that allow students to learn at their own pace, in their own way, and at their own time.	4.19	.865	Significantly Demonstrated
provides teachers with access to a variety of digital tools for differentiating instruction.	4.30	.819	Significantly Demonstrated
uses technology to create learning experiences that are accessible and engaging for all students, including those with disabilities.	4.23	.837	Significantly Demonstrated
provides alternative learning options and support for students with limited access to technology.	4.21	.823	Significantly Demonstrated
offers coaching and mentoring to support teachers in implementing personalized learning strategies effectively.	4.24	.814	Significantly Demonstrated
OVERALL	4.23	.766	Significantly Demonstrated

Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated 1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

The data in Table 8 presents the readiness level of the 32 elementary school heads from the Candelaria East and West District in terms of Education 4.0, specifically regarding Personalized Learning Approaches.

The results show that school heads are significantly prepared for Education 4.0 in terms of offering adaptable learning environments that allow students to learn at their own pace, in their preferred style, and on their schedule, as evidenced by a total mean score of 4.23, with a verbal interpretation of “Significantly Demonstrated”. It means that the heads of schools give teachers

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access to a variety of digital tools for customizing instruction and encourage the use of technology to create learning experiences that are accessible and engaging for all students, including those with disabilities. They also offer alternative learning opportunities and help students who have limited access to technology. Aside from that, school administrators provide coaching and mentorship to help instructors effectively use individualized learning practices.

The statement indicating that school leaders provide teachers with a variety of digital resources for individualized instruction received the verbal interpretation "Significantly Demonstrated" with the highest mean score of 4.30. This result indicates that public school leaders in Candelaria East and West Districts are actively and successfully supporting teachers in meeting diverse learning needs. They do this through providing training and resources such as Learning Action Cells or LAC sessions specifically on differentiated instruction and strengthening this through the use of technology. This helps teachers understand how to vary content, process, product, and learning environment. They also promote and support teachers in using flexible grouping strategies like pairing students based on readiness, interest, or learning style. This moves away from static grouping and allows students to work with different peers and on different tasks as needed.

Individualized instruction is a core tenet of modern pedagogy, and the provision of digital resources is a key enabler of this approach. By providing a variety of digital resources, principals are equipping teachers with the tools they need to implement effective individualized instruction. This empowers teachers to tailor content, pace, and support to each student, leading to more targeted and effective teaching. In summary, this result indicates that school leaders are highly effective in supporting individualized instruction through the provision of digital resources, resulting in more empowered teachers, enhanced student learning experiences, and a strategic, purposeful integration of technology within the school.

According to Patiño et al. (2023), Education 4.0 transforms education by combining cutting-edge technology, individualized learning, and 21st-century skills. These technologies create dynamic and individualized learning experiences, aligning with the student-centered approach of active learning. Active learning theory emphasizes student engagement and participation in the learning process through activities such as conversations, analysis, and problem-solving. Active learning is strengthened in Education 4.0 by incorporating advanced technology such as artificial intelligence, virtual reality, and cloud computing. Technological advancements offer collaborative, inventive, and adaptive learning environments, enhancing the effectiveness of active learning practices in preparing students for the future workforce. This would not have been possible in a certain academic institution without the initiative, encouragement, and support of the school's head.

According to Okeke (2019), collaborating with teachers and encouraging them to enhance educational processes is a crucial concept in educational management. It also involves leveraging teachers' strengths and potential, adapting them to educational aims, or, in other words, enhancing teaching and learning. Thus, leadership is extremely important for learning and, as such, is essential for achieving higher levels of academic success.

Table 9 on the next page presents the readiness of school heads in Education 4.0 in terms of collaboration and Networking.

The result indicates that school leaders significantly demonstrated their readiness to engage in the era of Education 4.0 in terms of Collaboration and networking, as evidenced by an accumulated mean of 4.35.

The term "Education 4.0" refers to the shift in education driven by advancements in technology, such as AI, big data, and IoT, and the demands of the Fourth Industrial Revolution. It emphasizes personalized learning, collaboration, digital literacy, and lifelong learning. A "Significantly Demonstrated" rating indicates that school leaders are not just passively reacting to these changes but are actively and effectively preparing their schools for this new educational paradigm. The high competence in Collaboration and Networking means that leaders are very proficient in fostering connections, sharing knowledge, and working together both within and outside the school. This includes encouraging teachers, staff, and departments to collaborate using digital tools and platforms, connecting with other schools, educational institutions, industry experts, parents, and community members, and actively utilizing online professional learning networks, social media for professional development, and other digital tools to facilitate these connections.

Table 9
Level of School Heads' Collaboration and Networking

Statements	Mean	SD	Verbal Interpretation
The school head... actively participates in online Professional Learning Communities (PLCs), forums, and discussion groups to connect with other educators, share best practices, and seek support.	4.32	.834	Significantly Demonstrated
utilizes digital platforms (e.g., school internet, learning management systems, communication apps) to facilitate communication and collaboration among teachers, staff, and parents.	4.25	.821	Significantly Demonstrated
encourages the use of online collaboration tools (e.g., Google Docs, shared drives) for collaborative curriculum development, lesson planning, and team projects.	4.25	.816	Significantly Demonstrated

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utilizes digital platforms (e.g., school website, social media, email) to engage with the school community, share information, and gather feedback.	4.38	.712	Significantly Demonstrated
utilizes online professional development platforms (e.g., online courses, webinars, professional development networks) to enhance their own professional learning and provide professional development opportunities for teachers.	4.56	.758	Fully Demonstrated

OVERALL	4.35	.725	Significantly Demonstrated
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Legend: 4.50-5.00 – Fully Demonstrated 3.50-4.49 – Significantly Demonstrated 2.50-3.49 – Sometimes Demonstrated 1.50-2.49 – Minimally Demonstrated 1.00-1.49 – Not Demonstrated

The indicator with the highest mean indicates that respondents believe their school heads have “fully demonstrated” the utilization of online professional development platforms, such as online courses, webinars, and professional development networks, in enhancing their professional learning and providing professional development opportunities for teachers, with a mean of 4.56. Such PD programs are INSETs, Google for Education series of trainings, MOOCs and other trainings hosted by DepEd and private organizations like Vibal and SEAMEO Innotech. This rating signifies that school heads are not just dabbling in online professional development (PD) but are consistently and effectively engaging with it at the highest level. This indicates a deep commitment to their own continuous learning and professional growth, acknowledging that education is a dynamic field that requires constant updates. By actively using online platforms for their development, school heads are modeling the very behavior they want to see in their teachers. This sends a powerful message about the value of online learning and adaptability in the digital era. It positions them as credible leaders in guiding their staff towards digital proficiency and effective use of educational technology.

Şenol (2020) emphasized the need for professional development in school leadership, stating that the changing nature of globalization necessitates continuing development for educational leaders. As a result, leaders can stay current with best practices and apply newly acquired skills by participating in carefully designed professional development programs offered by various educational institutions and joining relevant learning groups.

The principal plays a crucial role in fostering a collaborative working environment among instructors and students, as well as providing the necessary conditions for pedagogical progress. According to Mendoza and Hife (2020), educational leaders were able to elicit initiative and excitement from instructors to accomplish numerous responsibilities, while also fostering an environment of openness and trust, which improved the organization's performance.

Table 10

Summary Table of the Level of School Heads' Readiness for Education 4.0

Statements	Mean	SD	Verbal Interpretation
Adoption of Emerging Technologies (e.g., AI, VR, AR)	4.12	.788	High
Curriculum Innovation	4.21	.773	High
Personalized Learning Approaches	4.23	.766	High
Collaboration and Networking	4.35	.725	High
OVERALL	4.23	.736	High

Legend: 4.50-5.00 – Very High 3.50-4.49 – High 2.50-3.49 – Moderately High/Low 1.50-2.49 – Low 1.00-1.49 – Very Low

Table 10 presents a summary of the school heads' level of readiness for Education 4.0, which received a descriptive value of “High” and accumulated a weighted mean of 4.23. It indicates that, across four dimensions, school heads are actively and effectively adapting to these new demands. They are not merely aware but are taking concrete steps to prepare their schools for this new era. It means that school leaders are not just strong in one or two areas but exhibit a holistic preparedness for the challenges and opportunities presented by Education 4.0. This result implies that school heads are acting as visionary leaders, understanding the future direction of education and positioning their schools to thrive within it. They are likely setting strategic goals, investing in the right technologies, and cultivating a culture of innovation.

School heads “High” preparedness result in Collaboration and Networking, receiving the highest overall mean score of 4.35. At the same time, the area Adoption of Emerging Technologies (e.g., AI, VR, AR) was interpreted as “High” as well, although it got the lowest average of 4.12.

The high level of readiness suggests that the schools are well-equipped to leverage emerging technologies and pedagogical innovations. They have a solid foundation upon which to build further advancements in education. And when school leaders are highly ready for Education 4.0, it translates into a greater likelihood of successful implementation of related initiatives. This could mean more personalized and student-centered learning environments, increased integration of digital tools and resources in

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teaching, enhanced professional development opportunities for teachers focused on future-ready skills, and stronger connections between the school and the broader community and industry.

Pedagogy in Education 4.0 was established to meet the demands of Industry 4.0, and it has accelerated educational reforms in terms of content, curriculum, and education management (Kin & Kareem, 2019). This rapid development has impacted the future of education (Kassim & Teng, 2018). Thus, managing change entails school leaders' ability to advocate change, empower and support people to change, and make change sustainable (Kin & Kareem, 2018). In the context of Education 4.0, school leadership is viewed as a process that occurs within the framework of technology, communication, cooperation, problem-solving, innovation, professional development, and the capabilities of school leaders.

According to a study by Kim and Kareem (2019), there is an urgent need to reskill or upskill school leaders' competencies to prepare schools for the demands of the Fourth Industrial Revolution (Education 4.0). It argues that school leaders are the main change agents and have the daunting task of building an effective learning ecosystem to prepare students for the future. They emphasize that effective school management and positive student outcomes are heavily dependent on the professional competencies of school leaders. They propose a framework of critical educational leadership competencies for Education 4.0, including digital literacy, communication, collaboration, critical thinking, creativity, managing change, and entrepreneurial skills – all of which directly relate to the kind of readiness being discussed. They explicitly state that school leaders need to respond to the needs of Education 4.0 with sufficient competencies so that they can be effective leaders who can bring schools to the next level. This underscores the importance of a high level of readiness among school heads for schools to successfully navigate and thrive in the Education 4.0 era.

PART III. ELEMENTARY SCHOOL'S DIGITAL TRANSFORMATION

Table 11

Level of Schools' Integration of Digital Tools in Teaching

Statements	Mean	SD	Verbal Interpretation
It can be observed that...			
teachers demonstrate strong digital literacy skills and are comfortable using a variety of educational technologies.	4.14	.783	Often Observed
teachers consistently and meaningfully integrate digital tools into their daily instruction, beyond basic presentation software.	4.15	.786	Often Observed
teachers utilize a diverse range of digital tools, including Learning Management Systems (LMS), Educational Software, Online Resources, and Creative Tools.	3.06	.882	Sometimes Observed
technology is used to differentiate instruction and meet the diverse needs of all learners, including students with disabilities.	4.11	.853	Often Observed
students are actively engaged and motivated by the use of technology in the classroom.	4.09	.860	Often Observed
OVERALL	4.11	.746	Often Observed

Legend: 4.50-5.00 – Always Observed 3.50-4.49 – Often Observed 2.50-3.49 – Sometimes Observed

1.50-2.49 – Rarely Observed 1.00-1.49 – Never Observed

It can be gleaned from Table 11 that the perceived degree of the use and integration of Digital Tools in Teaching is part of the schools' digital transformation.

The respondents generally agree that digital tools are regularly integrated into teaching practices, as indicated by a total mean score of 4.11, which falls within the "Often Observed" range. This score indicates that digital tools are a common feature in the classrooms of Candelaria, Quezon. It's not just an occasional or experimental use; rather, teachers are frequently incorporating technology into their daily lessons. This suggests a widespread acceptance and adoption of digital resources in the teaching and learning process across the elementary schools in the area. It reflects that investments in technology and teacher training are yielding positive results in classroom practice.

Teachers often observed to be consistently and meaningfully integrated digital tools into their daily instruction, beyond basic presentation software. It got the highest mean score of 4.15. This is a strong indicator of a progressive teaching environment where technology is leveraged to transform the learning experience. Meaningful integration implies that digital tools are being used to enhance learning outcomes, make lessons more interactive, and engage students more deeply. This shifts the focus from passive consumption of information to active participation and creation.

In summary, the 4.11 mean score indicates that elementary school teachers in Candelaria, Quezon, are highly proficient and consistent in utilizing a variety of digital tools to enhance their daily instruction in ways that go beyond superficial use, resulting in more dynamic and effective learning experiences for students.

Meanwhile, the least observed indicator, which is the utilization of a diverse range of digital tools, including Learning

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Management Systems (LMS), Educational Software, Online Resources, and creative tools, received the lowest mean of 3.06. Despite having the lowest mean score, several elementary schools in Candelaria have demonstrated adequate use of the sample digital tools and resources. However, it still indicates that the amount of digital transformation in this section is "Sometimes Observed". This low score directly contrasts with the higher scores for general digital tool integration (4.11) and meaningful integration (4.15). This suggests that while teachers are integrating technology in a meaningful way, the range of tools they are comfortable using is more limited. They might rely heavily on a few familiar tools rather than exploring a broad spectrum. A low mean for LMS and specialized software indicates that these more complex platforms, which are often central to comprehensive digital learning ecosystems, are not being consistently or widely utilized. This limits the full potential of digital learning.

In essence, while elementary schools in Candelaria, Quezon, are generally effective at integrating digital tools meaningfully, they are currently underutilizing the full spectrum of available digital resources. This indicates that their digital transformation is strong in application but still has significant room to grow in terms of the breadth and sophistication of the tools being employed.

In the Philippines, the government is beginning to digitalize its educational processes with the establishment of several initiatives, including DepEd Commons, DepEd TV, DepEd Radio, DepEd Learning Management System, and DepEd Mobile App (Ponti, 2021; Hernando-Malipot, 2021). Such initiatives have helped to increase the use of digital platforms and other technologies in the classroom. Consequently, the country's education system is shifting toward the use of ICT through the Digital Rise Program, which provides online learning tools to classrooms, teachers, and students (Llego, 2020). Filipinos are among the world's most active users of the Internet and social media (Baclig, 2022), which is crucial for digital transformation in education. Thus, schools must place greater emphasis on the importance of diversifying digital tool use to leverage the potential of digital transformation fully.

Presented in Table 12 is the result of schools' perceived level of Digital Infrastructure Development as part of the schools' Digital Transformation.

As demonstrated in the table below, the schools are making every effort to enhance their Digital Infrastructure. It falls under the verbal interpretation of "Often Observed" with a total mean of 3.77. indicates that schools in Candelaria, Quezon, are regularly and consistently working on improving or maintaining their digital infrastructure. This is a positive sign that efforts are being made. While efforts are being made, the score suggests that schools might still face challenges in consistently providing top-tier digital infrastructure. These challenges could include budgetary constraints, technical expertise, scalability, and outdated equipment.

The highest indicator, with a verbal interpretation of "Often Observed" and a mean score of 4.19, indicates that schools have clear data privacy policies and procedures in place to ensure the responsible collection, use, and storage of student data. In the Philippines, schools' data privacy policies and procedures for responsible collection, use, and storage of student data are primarily guided by the Data Privacy Act of 2012 (Republic Act No. 10173) and its Implementing Rules and Regulations (IRR), alongside specific issuances from the Department of Education (DepEd) and advisories from the National Privacy Commission (NPC).

Table 12
Level of Schools' Digital Infrastructure Development

Statements	Mean	SD	Verbal Interpretation
It can be observed that...			
school has adequate number of devices (computers, laptops, tablets, etc.) for student and teacher use, ensuring equitable access for all.	3.34	1.155	Sometimes Observed
school has consistent, high-speed internet access across the entire school campus, including classrooms, and administrative areas.	3.85	.975	Often Observed
school has available wide range of educational software, online resources, and digital learning platforms.	3.73	1.114	Often Observed
school has available dedicated IT support staff to address technical issues, provide troubleshooting assistance, and maintain the school's technology infrastructure.	3.76	1.208	Often Observed
school has clear data privacy policies and procedures to ensure the responsible collection, use, and storage of student data.	4.19	.921	Often Observed
OVERALL	3.77	.919	Often Observed

Legend: 4.50-5.00 – Always Observed 3.50-4.49 – Often Observed 2.50-3.49 – Sometimes Observed

1.50-2.49 – Rarely Observed 1.00-1.49 – Never Observed

The high mean score indicates that respondents perceived elementary schools in Candelaria, Quezon, to be quite diligent and consistent in establishing and following data privacy protocols. This is a critical aspect of responsible digital citizenship and school operations in the modern era. There are likely written guidelines, rules, and steps that teaching and non-teaching personnel

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are expected to follow when handling student data. The presence and implementation of such policies are crucial for building trust with parents, students, and the community. It assures stakeholders that sensitive student information is being handled with care and responsibility, minimizing risks of misuse or breaches. To ensure the responsible collection, use, and storage of student data, schools require a robust digital infrastructure. This includes secure servers, reliable data storage systems, and appropriate backup solutions.

On the other hand, the statement that tells school has an adequate number of devices such as televisions, computers, laptops, tablets and interactive whiteboards for student and teacher use, ensuring equitable access for all, was perceived as "Sometimes Observed" and got the lowest average mean score of 3.34. It suggests that while devices might be present some of the time or in some classrooms due to DepEd Digital Rise Program and Digital Education 2028 that committed to adaptability and technological advancement through provision of technology resources and devices, there is a clear and consistent lack of sufficient devices to ensure all students and teachers have equitable access when needed. This explicitly highlights that device availability is the most significant bottleneck or weakest link in the school's digital readiness.

According to the study of Kunjiapu et al. (2025), significant infrastructure and technological barriers, including a lack of devices, are a major impediment to digitalization. They noted that many students and educators lack access to essential devices, such as laptops and smartphones, which further limits their participation in digital education. This directly supports the notion that a lack of devices hinders broader digital transformation efforts.

Table 13
Level of Schools' Teacher Training and Professional Development

Statements	Mean	SD	Verbal Interpretation
It can be observed that...			
school focuses on how to effectively integrate technology into teaching and learning, rather than simply teaching teachers how to use specific tools.	4.22	.816	Often Observed
school provides high-quality professional development opportunities that are engaging, interactive, and relevant.	4.17	.748	Often Observed
school utilizes experienced and knowledgeable facilitators, such as technology specialists or other expert educators.	4.04	.879	Often Observed
school encourages teachers to explore new technologies and share their expertise.	4.30	.693	Often Observed
school encourages teachers to reflect on their learning and develop action plans for integrating technology in their classrooms.	4.22	.741	Often Observed
OVERALL	4.19	.706	Often Observed
Legend: 4.50-5.00 – Always Observed 3.50-4.49 – Often Observed 2.50-3.49 – Sometimes Observed 1.50-2.49 – Rarely Observed 1.00-1.49 – Never Observed			

The results of the perceived level of schools' teacher training and Professional Development, as part of their digital transformation, are presented in Table 13.

It is evident in the overall results that most schools foster a culture of continuous learning among the teaching staff, which is essential for adapting to the ever-evolving educational landscape of Education 4.0, as it accumulated a total mean of 4.19 and received a verbal interpretation of "Often Observed". This means that teachers frequently participate in training, workshops, and learning opportunities, often through formal school-led initiatives, online courses, or professional learning communities. These trainings are In-Service Training of teachers, Learning Action Cells (LACs), various DepEd-initiated trainings, and trainings and workshops organized by different public and private organizations. Teachers are required to attend on some of the said trainings. There is an expectation and encouragement for teachers to seek out new knowledge, refine their skills, and reflect on their practices to enhance teaching and learning.

Teacher quality characteristics are crucial for a successful teaching system that enhances student achievement (Norakmar et al., 2020). One measure of teacher quality is their knowledge of digital skills. According to Jannah et al. (2020), the most important aspect affecting the success of digital-based learning is not only the availability of digital equipment, but also the abilities that teachers must possess.

It can also be gleaned from the table that most of the schools encourage teachers to explore new technologies and share their expertise, which means it is significantly demonstrated and "Often Observed," with the highest average score of 4.30. This implies that schools are creating a safe space for teachers to try new things, knowing that these explorations can lead to breakthroughs in teaching and learning. This aligns well with your earlier finding that school heads set goals to remain current on emerging technologies. When teachers are encouraged to explore and share, it boosts their professional autonomy and sense of agency. They become active participants in their professional development and in shaping the future of the school's digital learning landscape.

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The emphasis on "sharing their expertise" is equally significant. It means that schools recognize and value the knowledge and skills individual teachers gain through their exploration.

Basitere and Ndeto-Ivala (2017) showed that the use of technology can facilitate deep and meaningful collaborative learning. The result was a subtle contribution to exceptional performance and technological excellence. Furthermore, Hero's (2019) research found that teachers demonstrate expertise in incorporating technology into their classroom instruction, viewing it as a pedagogical innovation within the education paradigm.

Meanwhile, the statement that says the schools utilize experienced and knowledgeable facilitators, such as technology specialists or other expert educators, has the lowest mean score of 4.04. Yet, I still fall under the descriptive rating "Often Observed". We can conclude that, while schools recognize the value of expert guidance in professional development (PD) and provide it regularly, there may be a gap in the consistent and pervasive availability of highly specialized support across all digital learning initiatives. It suggests an opportunity to enhance the depth and reach of expert-led professional development to realize digital transformation goals fully.

Table 14
Level of Schools' Student Engagement with Digital Learning

Statements	Mean	SD	Verbal Interpretation
It can be observed that...			
students show active participation to online discussions, forums, or collaborative projects.	3.98	.933	Often Observed
students consistently use digital resources like e-books, videos, and simulations.	3.79	1.027	Often Observed
students apply digital tools to solve complex problems and critical thinking exercises.	3.38	1.055	Sometimes Observed
students utilize digital tools for creative projects like digital art, music production, or video editing.	3.61	1.013	Often Observed
students skillfully use devices like computers, tablets, and smartphones in learning.	3.69	.903	Often Observed
OVERALL	3.69	.894	Often Observed

Legend: 4.50-5.00 – Always Observed 3.50-4.49 – Often Observed 2.50-3.49 – Sometimes Observed

1.50-2.49 – Rarely Observed 1.00-1.49 – Never Observed

Presented in Table 14 is the result of the perceived level of schools' Student Engagement with Digital Learning as part of Digital Transformation.

As shown in the table, it is evident that students demonstrate active participation, attention, curiosity, interest, and motivation when interacting with educational content and activities through digital tools and platforms, which is often observed, as it has accumulated a total mean of 3.69. Based on the overall results, schools in Candelaria, Quezon, are largely successful in engaging students actively and making them interested in digital learning, representing a significant step in their digital transformation journey. However, addressing resource limitations, particularly device availability and the diversity of tools, could potentially elevate this engagement to an even higher, more consistent level.

The indicator that shows students actively participating in online discussions, forums, or collaborative projects. Students who show active participation in online discussions, forums, or collaborative projects received the highest mean of 3.98, with a verbal interpretation of "Often Observed." It proves that the schools are successfully leveraging digital tools to foster interactive, social, and higher-order learning experiences among their students. This demonstrates a significant step towards the collaborative learning goals of Education 4.0 and Digital Transformation.

According to Hofer et al. (2021), the incorporation of technology in educational institutions has the potential to create more engaging learning experiences. Increased student involvement with learning materials is particularly encouraging, as it promotes a positive connection between students and their learning materials. On the other hand, the statement that tells students to apply digital tools to solve complex problems and engage in critical thinking exercises was perceived as "Sometimes Observed" and received the lowest average mean score of 3.38. It indicates that while students are engaging with digital tools and participating in online activities, they are less frequently using these tools for more advanced cognitive tasks, such as complex problem-solving and critical thinking. This suggests that the current integration of digital tools might lean more towards facilitating communication, accessing information, or completing basic tasks, rather than consistently pushing students to use technology as a medium for analysis, evaluation, synthesis, and creative problem-solving. The data clearly indicates that digital tools are integrated into the learning environment. Students are using them, but often for activities like information access, communication, basic task completion, and content consumption. While these are valuable uses of technology, they don't consistently push students to the cognitive levels of analysis, evaluation, synthesis, and creative problem-solving. Digital tools, in these instances, might be serving as convenient replacements for traditional methods rather than powerful accelerators for deeper learning.

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Table 15

Summary Table of the Level of Schools' Digital Transformation

Statements	Mean	SD	Verbal Interpretation
Integration of Digital Tools in Teaching	4.11	.746	High
Digital Infrastructure Development	3.77	.919	High
Teacher Training and Professional Development	4.19	.706	High
Student Engagement with Digital Learning	3.69	.894	High
OVERALL	3.94	.746	High

Legend: 4.50-5.00 – Very High 3.50-4.49 – High 2.50-3.49 – Moderately High/Low 1.50-2.49 – Low 1.00-1.49 – Very Low

Table 15 displays the summary of schools' level towards Digital Transformation, which got a descriptive value of "High" and accumulated a weighted mean of 3.94. It shows that schools in the Candelaria East and West Districts are already adapting to these new demands in all four facets of digital transformation. They are not only informed but also taking practical actions to prepare the schools for the new era. It indicates that the schools are making clear, consistent, and substantial progress in their digital transformation efforts. It's not just a superficial change but a noticeable shift in how technology is integrated into various aspects of schooling.

As mentioned by Ilomaki and Lakkala (2018), in the face of these quick and ongoing changes, educational systems are pushed to innovate and adapt their teaching-learning environments to the changing needs of their student populations. As a result, modern technologies will become a fundamental component of students' learning, not just to improve their academic performance, but also to equip them with the skills necessary to function successfully in a digital society (Limna et al., 2022).

Teacher Training and professional development were often observed in schools, receiving the highest overall mean score of 4.19. This indicates that schools are performing exceptionally well in providing continuous learning opportunities for their teaching staff regarding digital tools and pedagogies. This is a crucial strength. It means that teachers are generally well-equipped, knowledgeable, and supported in understanding how to integrate technology into their teaching. The human capital aspect of digital transformation is strong.

Meanwhile, Student Engagement with Digital Learning was also interpreted as "High," although it had the lowest average of 3.69. This finding suggests that while student engagement is occurring, there may be more room for improvement in this area compared to others, or it may be a factor that is less consistently observed than other elements of schools' digital transformation. It might be due to resource limitations, particularly the insufficient number of devices and the lack of diverse, advanced digital tools, which are likely preventing student engagement from reaching its full potential. To further elevate student engagement, these fundamental resource gaps must be addressed.

In the Philippines, digitalization is gradually transforming the face of education. During the pandemic from 2020 to 2023, education at primary to tertiary levels employed a variety of teaching and learning methods that incorporated technology, ensuring the continuity of students' learning and employees' employment. The Learning Continuity Plan (LCP) was specifically introduced at the basic education level by the Department of Education (DepEd) in 2020. The Commission on Higher Education (CHED) has additionally reinforced the intrinsic academic freedom of higher education institutions to implement the essential learning plan, thereby continuing education at the tertiary level (CHED, 2020). These projects have included e-learning, remote learning, and other alternative delivery techniques in education.

Furthermore, the government is beginning to digitalize its educational processes with the establishment of several initiatives, including DepEd Commons, DepEd TV, DepEd Radio, DepEd Learning Management System, and DepEd Mobile App (Ponti, 2021; Hernando-Malipot, 2021). Such initiatives have helped to increase the use of digital platforms and other technologies in the classroom. Similarly, they have been essential in augmenting public schools' modular learning to improve student learning in several subject areas during the pandemic (Cho et al., 2021; Potane, 2022). Consequently, the country's education system is shifting toward the use of ICT through the Digital Rise Program, which provides online learning tools to classrooms, teachers, and students (Llego, 2020). Filipinos are among the world's most active users of the Internet and social media (Baclig, 2022), which is crucial for digital transformation in education.

PART IV. DIFFERENCE BETWEEN THE PERCEPTION OF SCHOOL HEADS AND TEACHERS

The Table 16 summarizes the detailed ANOVA results for each key variable related to School Heads' Digital Leadership Competence, School Heads' Readiness to Education 4.0, and School's Digital Transformation.

ANOVA (Analysis of Variance) tests whether there are statistically significant differences between groups for each variable. In this study, the researcher measured the differences in responses between school heads and teachers.

The F-statistic measures how much group means differ relative to the variation within groups. A higher F means a stronger effect.

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The p-value tells us whether these differences are statistically significant. A p-value less than 0.05 (*) is considered significant, and less than 0.01 (**) is highly significant. The strongest effects are seen in Digital Infrastructure Development ($F = 21.918$, $p < 0.01$), School's Digital Transformation ($F = 14.863$, $p < 0.01$) Curriculum Innovation ($F = 12.889$, $p < 0.01$), and School Head's Readiness for Education 4.0 ($F = 12.11$, $p = 0.001$).

All variables tested show at least significant, and most highly significant, differences between groups. This means that schools differ meaningfully in these areas, and these differences are not due to random chance.

In practical terms, these results indicate that schools with higher digital leadership competence and readiness have significantly better outcomes in digital transformation, infrastructure, curriculum innovation, and related areas. The consistently low p-values across all variables reinforce the strength of these findings. Even the lowest F-statistics, such as Innovation Management and Digital Communication Skills, are still statistically significant, showing that every aspect of digital leadership measured here plays a role in differentiating schools' digital transformation success.

Table 16

Difference on the Perceptions of School Heads and Teachers as to School Heads' Digital Leadership, School Heads' Readiness to Education 4.0, and Schools' Digital Transformation

		Sum of Squares	df	Mean Square	F	Sig.
Visionary Leadership	Between Groups	4.033	1	4.033	7.482	.006
	Within Groups	344.456	639	.539		
	Total	348.489	640			
Technological competence	Between Groups	2.127	1	2.127	3.785	.052
	Within Groups	359.058	639	.562		
	Total	361.185	640			
Innovation management	Between Groups	5.575	1	5.575	9.094	.003
	Within Groups	391.755	639	.613		
	Total	397.330	640			
Digital communication skills	Between Groups	.317	1	.317	.623	.430
	Within Groups	325.214	639	.509		
	Total	325.531	640			
Over-all School Heads' Digital Leadership Competence	Between Groups	2.553	1	2.553	5.115	.024
	Within Groups	318.915	639	.499		
	Total	321.468	640			
Adoption of emerging technologies	Between Groups	7.834	1	7.834	12.835	.000
	Within Groups	390.024	639	.610		
	Total	397.858	640			
Curriculum innovation	Between Groups	7.569	1	7.569	12.889	.000
	Within Groups	375.253	639	.587		
	Total	382.822	640			
Personalized learning approaches	Between Groups	5.931	1	5.931	10.267	.001
	Within Groups	369.127	639	.578		
	Total	375.058	640			
Collaboration and networking	Between Groups	4.716	1	4.716	9.082	.003
	Within Groups	331.846	639	.519		
	Total	336.562	640			
Over-all School Head's Readiness to Education 4.0	Between Groups	6.448	1	6.448	12.110	.001
	Within Groups	340.256	639	.532		
	Total	346.705	640			
Integration of digital tools in teaching.	Between Groups	3.506	1	3.506	6.354	.012
	Within Groups	352.598	639	.552		
	Total	356.104	640			
Digital infrastructure development	Between Groups	17.945	1	17.945	21.918	.000
	Within Groups	523.162	639	.819		
	Total	541.107	640			
Teacher training and professional development	Between Groups	5.793	1	5.793	11.829	.001
	Within Groups	312.900	639	.490		
	Total	318.692	640			
Student engagement with digital learning	Between Groups	8.184	1	8.184	10.387	.001
	Within Groups	503.473	639	.788		
	Total	511.657	640			
School's	Digital	8.088	1	8.088	14.863	.000

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Transformation	Within Groups	347.743	639	.544
	Total	355.832	640	

In summary, the ANOVA results provide strong evidence that digital leadership and readiness are critical drivers of digital transformation in schools.

The table breaks down the variance in responses for each variable into "Between Groups" (differences between teachers and school heads) and "Within Groups" (variation within each group). This analysis reveals that, at least for certain aspects of digital leadership, teachers and school administrators do not share the same perspective. This is important for understanding where perceptions align and where they diverge, which can inform targeted interventions or professional development.

The results indicate that Digital Infrastructure Development has the largest perception gap between teachers and school heads, as evidenced by the highest F-value (21.918) and a highly significant p-value. This suggests that school heads and teachers in Candelaria, Quezon, have notably different views on the adequacy and effectiveness of digital infrastructure in their schools. One likely reason is that school heads, who are responsible for overseeing and reporting on infrastructure projects, may have a more optimistic or strategic perspective, focusing on completed upgrades, procurement, or plans. They may be more aware of budgets, investments, and policy intentions, which can lead them to rate infrastructure development more favorably. In contrast, teachers interact daily with the actual technology and resources in classrooms. They are more likely to encounter practical issues such as unreliable internet, insufficient devices, or a lack of technical support, which can lead to lower ratings. This gap may also be widened if communication about infrastructure improvements is not transparent or if teachers feel their feedback on needs and challenges is not fully considered in decision-making. Ultimately, the significant difference highlights the importance of aligning leadership perspectives with on-the-ground realities to ensure that digital infrastructure investments truly meet the needs of both educators and students.

The fact that Digital Communication Skills shows almost no significant difference between teachers and school heads ($F = 0.623$, $p = 0.430$) suggests that both groups have similar perceptions about communication competencies in the digital realm. This alignment likely occurs because digital communication skills are more observable and universally experienced by both groups in their daily interactions. Unlike infrastructure development or strategic visioning, which may be perceived differently based on role responsibilities, digital communication involves concrete, measurable behaviors that both teachers and school heads can assess similarly. Both groups regularly use email, messaging platforms, video conferencing, and other digital tools to communicate with colleagues, parents, and students, giving them comparable reference points for evaluation.

Additionally, digital communication skills are often more standardized and less dependent on resource allocation or strategic planning - they rely more on individual competency and familiarity with common digital platforms rather than institutional support or infrastructure. The shared experience of adapting to digital communication tools, particularly accelerated by recent global events that necessitated remote learning and virtual meetings, has likely fostered a common understanding of what constitutes effective digital communication. Furthermore, communication skills are more immediately apparent in daily interactions, making it easier for both groups to accurately assess competency levels, whereas other areas, such as innovation management or infrastructure development, may be more abstract or removed from direct observation for one group or the other.

School heads consistently rate themselves and their schools higher than teachers do across almost all dimensions. This comprehensive analysis reveals systematic differences in how teachers versus school heads perceive digital leadership effectiveness and transformation progress, with school heads generally having more optimistic assessments. School heads consistently rate digital leadership, readiness for Education 4.0, and digital transformation higher than teachers do, as shown by significant F-values and low p-values in most categories, such as Visionary Leadership, Innovation Management, and Digital Infrastructure Development. Thus, it can be concluded that there is a significant difference between the responses of the school heads and teachers. Hence, the null hypothesis is rejected.

The difference between the responses of school heads and teachers may be due to the differences in their roles and responsibilities. School heads are responsible for setting vision, policy, and reporting progress. They may have a more strategic, optimistic view of digital initiatives, focusing on plans and intentions. Meanwhile, teachers experience the day-to-day realities of implementation. They may encounter more obstacles, such as a lack of resources, training, or support, that school heads are less aware of. It may be due to access to information. School heads often have access to more comprehensive information about school-wide initiatives, funding, and plans, which can make them more optimistic about progress. Teachers, on the other hand, may only see what directly affects their classrooms, leading to a more critical or realistic assessment of the situation. Another possible reason is the resource allocation. School heads may believe that resources such as technology, infrastructure, and training are adequate because they oversee budgets and procurement. Teachers may feel resources are unevenly distributed or not reaching the classroom level, especially in large or underfunded schools.

In conclusion, perception gaps are caused by disparities in roles, access to information, training, resource allocation, communication, and evaluation standards. Addressing these gaps demands more collaborative planning, open communication, and

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targeted teacher assistance to ensure that digital transformation is both visionary and practical at all levels of the school.

PART V. PREDICTORS OF SCHOOL HEADS' DIGITAL LEADERSHIP COMPETENCE AND READINESS FOR EDUCATION 4.0 ON SCHOOLS' DIGITAL TRANSFORMATION

Table 17

Tests of the Relationship between School Heads' Digital Leadership Competence and Schools' Digital Transformation

School Heads' Digital Leadership Competence	Elementary Schools' Digital Transformation					Digital Transformation
	IDTT	DID	TTPDev	SEDL	Overall	
Visionary Leadership	.702**	.552**	.708**	.495**	.662**	
Technological Competence	.754**	.581**	.677**	.497**	.677**	
Innovation Management	.736**	.558**	.692**	.414**	.644**	
Digital Communication Skills	.744**	.585**	.733**	.519**	.696**	
Overall, School Heads' Digital Leadership Competence	.774**	.601**	.741**	.509**	.707**	

** . Correlation is significant at the 0.01 level (2-tailed).

Legend: IDTT -Integration of digital tools in teaching.

DID- Digital infrastructure development.

TTPD - Teacher training and professional development.

SEDL-Student engagement with digital learning.

DT – Digital Transformation

Table 17 presents detailed statistical data on the correlation between various aspects of school heads' digital leadership and the degree of digital transformation in their schools. This table presents the results of Pearson correlation analyses between different dimensions of digital leadership competence and the overall digital transformation observed in elementary schools.

The table is structured as a correlation matrix, where each row represents a specific dimension of digital leadership competence—such as visionary leadership, innovation management, technological competence, and digital communication skills—and each column shows the corresponding Pearson correlation coefficient (r), the significance level (p-value), and the sample size (N) for the relationship with digital transformation.

The results reveal that all dimensions of digital leadership competence are highly, positively and significantly correlated with digital transformation. For example, the correlation between visionary leadership and digital transformation is particularly strong, with a Pearson r value of 0.774 and a significance level of $p < .001$, indicating a very strong association. Similarly, innovation management exhibits a high correlation ($r = 0.741$, $p < .001$), as does technological competence ($r = 0.601$, $p < .001$). These findings suggest that as school heads demonstrate higher levels of competence in these areas, their schools are more likely to achieve greater progress in digital transformation initiatives.

The table also includes the sample size for each correlation, which is consistent across all dimensions, ensuring the reliability of the results. The consistently low p-values (all less than 0.01) across the board indicate that these relationships are statistically significant and unlikely to be due to chance.

In summary, the table provides compelling evidence that school heads' digital leadership in Candelaria East and West Districts, across multiple competencies, is a critical driver of digital transformation in elementary schools. The strong and significant correlations underscore the importance of investing in leadership development as a strategy for advancing digital initiatives in education. This analysis highlights the interconnectedness of leadership skills and successful digital change in schools.

With the country's efforts to digitalize schools, school leaders must lead the way in developing a digital culture in schools, so that students can fully benefit from their digital opportunities. To successfully integrate a digital culture in schools, digital resources are necessary, including leaders with established digital leadership abilities (Pendry & Salvatore, 2015). As a result, the principal's leadership is crucial in recognizing that schools are increasingly adopting cutting-edge technology in their teaching and learning processes. To attain educational goals, principals must be able to maximize the utilization of all available resources (Agustina et al., 2020). They integrate digital tools into all aspects of school management, resulting in a 360-degree transformation in the education industry.

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Table 18

Tests of the Relationship between School Heads' Readiness and Schools' Digital Transformation

School Head's Readiness	Elementary Schools' Digital Transformation				
	IDTT	DID	TTPDev	SEDL	Overall Digital Transformation
Adoption of Emerging Technologies	.740**	.580**	.685**	.432**	.655**
Curriculum Innovation	.737**	.597**	.748**	.489**	.692**
Personalized Learning Approaches	.739**	.595**	.745**	.518**	.700**
Collaboration and Networking	.732**	.576**	.731**	.495**	.682**
Overall, School Head's Readiness	.764**	.609**	.753**	.501**	.707**

** . Correlation is significant at the 0.01 level (2-tailed).

Legend: IDTT -Integration of digital tools in teaching.

DID- Digital infrastructure development.

TTPD - Teacher training and professional development.

SEDL-Student engagement with digital learning.

DT – Digital Transformation

Table 18 provides a comprehensive overview of the statistical relationships between various aspects of a school head's readiness for Education 4.0 and the digital transformation occurring within elementary schools. This analysis directly addresses whether being more prepared in specific areas translates to more advanced digital transformation in schools.

The table presents Pearson correlation coefficients (r) for five key dimensions of school head readiness: adoption of emerging technologies, curriculum innovation, personalized learning approaches, collaboration and networking, and an overall readiness composite score. Each of these readiness dimensions is correlated with several facets of digital transformation, including integration of digital tools in teaching (IDTT), digital infrastructure development (DID), teacher training and professional development (TTPDev), student engagement with digital learning (SEDL), and an overall digital transformation score.

All coefficients marked with ** are significant at the 0.01 level (2-tailed), meaning there is less than a 1% probability that these strong positive relationships are due to chance. The results show that all aspects of school head readiness are strongly and positively correlated with digital transformation outcomes. For instance, the overall readiness score has a high correlation with overall digital transformation ($r=0.707$, $p<.01$), and the readiness dimension most strongly associated with digital transformation is personalized learning approaches ($r=0.700$, $p<.01$). Even the lowest correlation, between adoption of emerging technologies and student engagement with digital learning ($r=0.432$, $p<.01$), is still considered a moderate positive relationship.

This means that as school heads become more prepared—whether by adopting new technologies, innovating curricula, personalizing learning, or fostering collaboration—their schools are more likely to experience successful digital transformation. The consistently high and significant correlations across all dimensions suggest that readiness is a critical driver of digital progress in schools.

In summary, the table provides strong evidence that the readiness of elementary school heads in Education 4.0 is closely linked to the success of digital transformation in elementary schools in Candelaria, Quezon. Investing in leadership development and readiness in these areas is likely to yield substantial benefits for schools aiming to advance their digital capabilities.

Table 19.

Regression of Elementary Schools' Digital Transformation on School Heads' Digital Leadership Competence and Readiness

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
6					
(Constant)	.884	.125		7.075	.000
School Heads Digital Leadership					
Innovation Management	.306	.067	.324	4.571	.000
Technological Competence	.197	.060	.198	3.271	.001
Digital Communication Skills	-.144	.068	-.138	-2.134	.033
School Head's Readiness					
Curriculum Innovation	.380	.050	.394	7.611	.000

R=.737 R Squared= .543 Adjusted R Square=.541 SEE =.505 F(4,636)=189.236 p=.000

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Table 19 presents a comprehensive multiple regression analysis, identifying the specific factors that significantly influence elementary schools' digital transformation. This regression model examines the predictive power of various dimensions of school heads' digital leadership competence and readiness in explaining the variance in digital transformation outcomes.

The regression analysis results indicate a strong and statistically significant relationship between schools' digital transformation and the digital leadership competence and readiness of school heads.

This suggests that 54.1% of the variance in digital leadership competence and readiness is explained by digital transformation, indicating a moderately strong predictive power. This value represents the average distance of the observed values from the predicted values. A lower standard error suggests a more precise model. A very high F-value with a p-value of 0.000 indicates that the regression model is highly significant. There is an extremely low probability that these results occurred by chance.

The regression analysis reveals that four key factors emerge as significant predictors of digital transformation in elementary schools. These are as follows:

Innovation Management, a dimension of digital leadership competence, demonstrates the strongest positive effect, with an unstandardized coefficient of $B = 0.306$ ($SE = 0.067$) and a standardized coefficient of 0.324. This coefficient is highly significant ($t=4.571$, $p<.001$), indicating that for every 1-unit increase in innovation management competence, digital transformation increases by approximately 0.306 units, holding all other variables constant. The standardized coefficient suggests that innovation management has the second-largest relative impact among the predictors.

Curriculum Innovation, representing school heads' readiness, emerges as the most influential predictor, with an unstandardized coefficient of $B = 0.380$ ($SE = 0.050$) and the highest standardized coefficient of 0.394. This relationship is highly significant ($t = 7.611$, $p < .001$), demonstrating that curriculum innovation readiness has the strongest relative impact on digital transformation. This finding suggests that school heads who are prepared to innovate curricula are most likely to lead successful digital transformation initiatives in their schools. Digital transformation in education isn't just about procuring devices or setting up Wi-Fi. It's fundamentally about transforming the teaching and learning process itself. School heads who are ready to innovate curricula possess a forward-thinking mindset. They don't see technology as an add-on, but as a catalyst for fundamentally re-imagining what students learn and how they learn it. They understand that digital tools enable new pedagogies and new learning outcomes. Instead of simply adopting digital tools, school heads with this readiness focus on their purposeful integration into the curriculum. Curriculum innovation readiness is inherently linked to pedagogical innovation. A school head prepared to innovate the curriculum will encourage teachers to explore new teaching methods that leverage digital tools, such as personalized learning paths, blended learning models, and data-driven instructions.

Technological Competence, another dimension of digital leadership, shows a moderate positive effect, with a beta coefficient of 0.197 (standard error = 0.060) and a standardized coefficient of 0.198. This coefficient is statistically significant ($t = 3.271$, $p = .001$), indicating that technological skills contribute meaningfully to digital transformation, albeit to a lesser extent than innovation management and curriculum innovation.

Interestingly, Digital Communication Skills presents a negative relationship with digital transformation ($B = -0.144$, $SE = 0.068$, $\beta = -0.138$), which is statistically significant ($t = -2.134$, $p = .033$). This unexpected finding suggests that a higher emphasis on digital communication skills may be associated with lower levels of digital transformation, possibly indicating that schools that focus heavily on communication technologies might be neglecting other aspects of comprehensive digital transformation.

The overall model demonstrates strong explanatory power, with an R^2 of 0.543, meaning that these four predictors collectively explain approximately 54.3% of the variance in elementary schools' digital transformation. The adjusted $R^2=0.541$ confirms that this explanatory power remains strong even after accounting for the number of predictors in the model. The model's overall significance is confirmed by the ANOVA results ($F(4,636)=189.236$, $p<.001$), indicating that the regression model as a whole is highly significant and that these predictors collectively have a meaningful relationship with digital transformation.

According to Akpan (2016), the most important issue in managing modern schools in an innovation environment is transforming the traditional school into a novel educational institution through the implementation of development techniques. The school heads' knowledge, capability, and abilities are solely responsible for the school's performance.

To support the results above, Çetin and Karsantik (2022) emphasize that school principals, as educational leaders, play a crucial role in driving institutional change and fostering innovation, drawing on leadership theories such as transformational and distributed leadership. As school leaders and in charge of local-level curriculum innovation, they oversee the design of Education 4.0-compatible learning environments, mobilize resources, and empower teachers to make changes. They highlight the importance of teachers' leadership in instructional design, curriculum creation, and technology integration to maximize the benefits of Education 4.0 in classrooms.

Digitalization will continue to provide challenges to future leadership practices. To effectively manage their teams in the future, leaders must understand how to navigate the rising challenges presented by the digital age. They must be technologically competent. The most successful digital transition begins with a shift in leaders' attitudes, which they must anticipate (Kane, 2019). In conclusion, this regression analysis identifies innovation management competence and curriculum innovation readiness as the

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most critical factors driving digital transformation in elementary schools. In contrast, technological competence provides additional, albeit more modest, contributions. The negative effects of digital communication skills warrant further investigation, but suggest that balanced leadership approaches, focusing on innovation and curriculum development rather than solely on communication technologies, are most effective for achieving comprehensive digital transformation in educational settings.

4. RECOMMENDATIONS

Since the findings proved that there is a significant relationship between the school heads' digital leadership, school heads' readiness for Education 4.0, and schools' digital transformation, the following recommendations are hereby offered and suggested.

The Department of Education may incorporate the concepts of digital citizenship into school management and leadership. For them to do this, the indicator should be included in the School Head's Development Program as one of the foundational courses for leadership for the principal. Principals should be more aware of how they can improve their digital leadership by attending a series of training sessions and seminars focused on technology in management and leadership. They may prioritize professional development in digital leadership skills, particularly in areas such as visionary leadership, innovation management, and digital communication. Since there is strong evidence that elementary school heads' digital leadership and readiness in Education 4.0 are closely linked to the success of digital transformation in schools, DepEd, through BHROD and NEAP may invest in leadership development and readiness of school heads to yield substantial benefits for schools aiming to advance their digital capabilities. Future researchers may undertake the same study to support or contradict the findings of this study and to provide additional insights into the influence of principals' digital leadership and readiness for Education 4.0 in promoting schools' digital transformation. They may be interested in the same parameter of the study or may undertake a similar study using other variables that are not included in the study. School systems and policymakers should support and resource leadership training that aligns with the demands of Education 4.0 to promote Digital Transformation in schools.

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