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Research Article

Best Practices of Digital Transformation in Optimized Public Secondary Schools: A Multiple Case Study

Lhea M. Vergara[1], Priscila A. Santos[2]*, Ryan John L. De Lara[2]

[1]Language Editor, Schools Division Office – Nueva Ecija Research Journals 3100, Philippines
[2]Graduate School, Wesleyan University-Philippines, 3100, Philippines

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**Corresponding author:*
E-mail:
prescy.santos16@gmail.com

ABSTRACT

Through a multi-case study of four schools in Nueva Ecija that were identified to have "Optimized" the integration of ICT in their operations, the paper entitled "Best Practices of Digital Transformation in Optimized Public Secondary Schools: A Multiple Case Study" aimed to determine the ICT - related best practices of digital transformation. Through the convergence of observation, interview, and school documents, it was determined that the best practices of digitally transformed schools are not only present in the teaching and learning domain, but also visible in the entirety of its school operations. Cross-case synthesis identified six recurring institutional best practices: Cross-case synthesis identified six recurring institutional best practices: (1) advanced network and access management, (2) comprehensive digitization of administrative and academic processes, (3) collaborative and gamified ICT-assisted instruction, (4) project-based experiential learning, (5) institutionalized peer mentoring mechanisms, and (6) dynamic school communication channels. The study highlights that sustained digital evolution is driven by adaptive leadership, robust infrastructure utilization, and a collaborative digital culture. These insights provide a conceptual roadmap for educational leaders and policymakers aiming to optimize digital governance and institutional capacity in public secondary education.

Keywords: *Best practices, Digital transformation, ICT integration, Public secondary schools*

Introduction

Given the multitude of hardware and digital tools now available, schools are compelled to leverage them to improve their institutional processes. But whether the use of Information and Communications Technology (ICT) simply aids their existing practices or transforms them into a more effective procedure is what distinguishes whether one has achieved digital transformation or is simply being an ICT-enabled institution. To contextualize this study, it is critical to distinguish between an 'ICT-enabled' institution and a 'digitally transformed' school; as outlined by Wessel et al. (2021), a technology-

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enabled school merely utilizes ICT to support existing practices, whereas a digitally transformed school fundamentally rebrands and optimizes its entire organizational and operational processes.

Educational institutions are compelled to evolve along with the demands brought by the digital age (Hidayat, 2024). As it is happening now, it is now the standard for schools to integrate ICT, especially in classroom instructions. Furthermore, this integration is also spreading to the other areas of school operations, which allows a lot of schools to become ICT-enabled organizations.

Being that technology integration is encouraged, the Department of Education (DepEd) has mandated a number of ICT – centered initiatives such as the DepEd Computerized Program (DCP), Digital Rise Program (DRP), Public Education Network (PEN), DepEd Internet Connectivity Project (DICP), along with the provision of Open Educational Resources (OERs), Learning Management Systems (LMS), DepEd TV, DepEd Radio and more. Yet, despite these ongoing efforts, progress remains uneven as challenges continue to hinder the full realization of digital transformation in public secondary schools. Many schools are still troubled by limited internet connectivity, particularly in far-flung areas. There are still schools that struggle with insufficient ICT infrastructure. There are still schools that lack the strategic direction and vision to pursue the integration of ICT in their work operations. Then, gaps in digital skills and digital readiness could also hinder the use of technology. Given these limitations, the need to understand how those successfully transformed schools managed to build and sustain the utilization of ICT for their institutional processes despite the constraints arises.

Now, bodies of literature have been written on digital transformation. However, most of the existing studies are concentrated on the challenges which impedes its adoption. Then in the local context, series of research mostly focused on the usage of ICT and how it affects teaching and learning. There are not many investigations on how schools navigate digital transformation or how it manifests in other areas of school operations aside from instructions delivery. This study addressed these gaps by exploring the overall manifestation of digital transformation in public secondary schools. This study also shed light on how digitally transformed schools implement and sustain ICT – related practices that optimize their school machinations.

The goal of this study is to determine the innovative practices, markers, and enabling factors for a successful digital transformation through case studies of digitally transformed schools. The findings from this research will inform school leadership with strategies, support policy choices with empirical evidence, and influence ICT programs and professional development designs. All in all, the results of this study will help strengthen the school management and digital governance.

Literature Review

Digital Transformation in Education: Definitions and Dimensions

The digital transformation refers to the strategic and fundamental rethinking of how educational institutions operate in a digital world. Integrating educational technology depends not only on the application of IT, but also requires modifications to curriculum design, leadership, teaching, and the school culture itself. Bond et al. (2018) state that when digital technologies are embedded into every aspect of the learning ecosystem, educational practices are revolutionized. The facilitation of digital citizenship, data-driven decision making, and flexible learning settings implies the following.

Many academics have considered the process of digital transformation as including three aspects: culture, pedagogy and technology – (Williamson & Hogan, 2020). In this case, change will mean one of how schools operate, collaborate, and evaluate changes, learning goals, etc., not just changing hardware and software. According to Zhu and He (2021), the smooth implementation of digital transformation is possible upon alignment of learners, digital tools and institutional goals.

In developing nations like the Philippines, the government is the driver of digital transformation. To provide learners with technology-enabled teaching and learning and to continue delivering instruction from a distance, the Department of Education (DepEd) has the DepEd Commons, the Learning Management System

(LMS), and the Digital Rise Program (DepEd, 2020). Push to strengthen the digital literacy of citizens will help improve connectivity.

Digital change happens because of effective leadership. As stated by Wang (2018), visionary leadership offers an accessible invitation to change, professional learning communities, and innovation. These school leaders who clearly articulate a digital vision and provide continuing support for innovation greatly assist in developing institutional readiness for the digital transformation.

Another dimension of transformation pertains to the access and quality of digital infrastructure. According to Trilling and Fadel (2017), connectivity, devices and digital resources enable schools to experiment with digital practices and help extend the use of these practices to more classrooms. In rural and disadvantaged areas, there are a range of problems in the digital infrastructure that are often overlooked. The digital competencies of educators are equally important. To practice meaningful, deep learning through technology, teachers need the right pedagogies and technology skills (Abedi, 2024). The digital skills of teachers are essential for creating innovative students and professionals. We must raise digital competence among teachers.

The ICT Integration Framework is a document commonly used by large educational systems such as those from UNESCO or regional ministries of education to digitally operationalize the whole system. According to UNESCO (2018), the useful factors related to digital learning refer to the readiness of the infrastructure, competence of the teacher, alignment of curriculum and assessment, and policy and leadership support. The DepEd ICT Framework of the Philippines (DepEd, 2020), for instance, emphasizes the enhancement of digital content, training, and governance structures.

Finally, personalized and inclusive learning pathways are created. It is possible to promote diverse learning needs and styles through data analytics, adaptive platforms and multimedia resources in schools. Per OECD (2021), students in schools that had advanced digitally showed better digital skills, higher engagement and better outcomes.

ICT Integration in Basic Education

ICT use in basic education refers to the intentional utilization of digital devices, technology, and/or any kind of ICT to facilitate, strengthen, and complement the various administrative, instructional, and learning processes in basic education. The technology integrates with curriculum, pedagogy and learner needs. According to UNESCO (2021), ICT integration is a necessary condition to inculcate 21st century skills and provide quality education.

People are now able to access digital technology like never before. As per the Livingstone et. al (2017), the internet connection among the youth has broadened worldwide which translates into greater use of ICT in schools. Nonetheless, a gap in access to services persists, especially in developing countries and rural areas. The insufficient infrastructure, poor connection, and limited devices continue to be a barrier to full integration.

To integrate technology effectively, it is not enough to simply provide access to it. Also consider pedagogy and instructional strategies that focus on the learner. Alenezi (2017) showed technology helping critical thinking, investigation and working together through constructivist techniques. Unless the aims and objectives are stated clearly, teaching and learning shall not be effective.

Teachers are a major player in successful ICT integration. According to research conducted by Koehler and Mishra (2018), it is essential that teachers possess a technical proficiency coupled with the pedagogical ability to design and execute tech-supported instructions. Professional development programs that focus on TPACK help increase teachers' confidence and expertise in their subject area.

Students gain immensely from meaningful ICT integration. As stated by Hamzah et al. (2021), a digital learning environment can boost student motivation, involvement, achievement and others. This is especially true when gamification and multimedia content are supplemented. The needs and preferences of the learners can be fulfilled with the help of ICT tools. The inclusion of ICT is changing how assessments are conducted. Digital platforms can assist with data-informed training, tracking learning progress, and providing real-time

feedback. Learning analytics and formative assessment apps help teachers to personalize their lessons.

Systemic support is critical for sustained integration. In order for ICT used to be effective and consistent, schools need policy, resources, and leadership. Combining the use of ICT in teaching and learning across levels and functions of an entire school makes it coherent and impactful.

ICT Infrastructure and Resource Management in Public Schools

The way technology is used in a classroom is affected by the access to and management of ICT infrastructure. There is a significant gap in ICT resources globally among educational institutions in rural and urban areas. Many learning institutes are unable to use ICT effectively due to poor technology, irregular internet access and lack of technical personnel (Gupta & Hayath, 2022). Efforts are being accelerated to eliminate inequities in technology and network investments and to ensure equal accessibility to technology (The Journal, 2025).

Across many remote areas in the Philippines, public schools continue to experience large gaps in access to technology (Espinoza et al., 2025). In many schools, the absence of a reliable power supply and consistent internet connection limits the full adoption of technological advances into instructional and administrative processes (DepEd, 2025). The day-to-day functioning of digitally aided learning environments is further undermined by low bandwidth and extremely low quality of service from local Internet providers. Also, there is the issue of securing funding. Because of low budgets, many schools prioritize their urgent physical needs over upgrading digitally (Espinoza et al., 2025). In addition, the technical specifications of the given ICT equipment often do not meet the technical requirements for a smooth classroom integration. In several situations, government-issued equipment was so obsolete or weak that they were completely useless, Navaro (2024) said in his study.

Its implementation is not efficient or effective. Public-private partnerships (PPP) and national infrastructure projects are now being implemented to address these gaps. The PPP School Infrastructure Project (PSIP 3), for example, calls for the construction of 15,000 classrooms with ICT and sustainable energy solutions by 2027. This program targets distant schools (DepEd, 2025). As noted, the Department of Information and Communications Technology (DICT) has also continued its rollout of the National Broadband Plan (Teach Educator, 2025). This national broadband initiative aims to aim better internet connectivity in public institutions like schools. Technical learning materials are growing in access because of these projects. They also play a role in reducing the digital gap.

A variety of aims is geared towards success. ICT is a heavily relied on program for the achievement of the "Education for all" goal by the year 2015 (Isanbor & Ekejiuba, 2025). Moreover, studies show that the proactive attitude, style of leadership, and training background of school heads all contribute significantly to the uneven utilization of ICT resources (Del Mundo, 2022). Programs and policies of a national scope, while providing extensive frameworks for digital transformation, rely significantly on local implementation and school capacity (DepEd, 2025).

Improving the ICT management at the school level is not just upgrading equipment or infrastructure. A more robust leadership framework, regular training, and better governance arrangements are also needed (Ngmenkpieo et al., 2023).

According to Diokno-Sicat and Maddawin (2023), decentralized governance has resulted in huge variations to the management and deployment of ICT resources across school divisions. This was supported by what Del Mundo (2022) said that some divisions with more engaged leadership have benefited from external private donors and municipal local government resources for ICT. Many other divisions experience issues that are related to bureaucratic red tape as well as lacking the technical expertise managing ICT programs once initially deployed. The uneven progress made so far indicates the need for more standardized systemic support that will ensure even ICT infrastructure and resource management regardless of area or wealth (Navarro, 2024).

The Role of Leadership and Governance in ICT Management

Zafar (2019) said that information and communication technology (ICT) is no longer seen as a mere supportive tool. The integration of ICT is now crucial in making education inclusive and relevant. Kalyani, (2024) claims that the education system including how teachers teach, students learn and how educational establishments conduct all depend on use of ICT or Information and Communication Technology. In addition, the International Computer and Information Literacy Study 2024 outlines that students should have mastered digital skills, as economies and societies rely on digital technologies. Moreover, Cabasan (2023) noted that public schools in the Philippines are being pressured to use digital technology to close learning gaps and prepare learners for the digital age.

According to Christensen et al. (2018), effective leadership and sound governance are key components of an ICT adoption in schools. Education leaders are people who not just provide resources but set the strategic plans for technology integration (ISTE, 2016). Valuable global frameworks like the ISTE Standards for Administrators highlight the importance of leaders in creating a shared vision that fosters innovative, digital learning, anywhere, anytime. Likewise, Hanisch et al. (2023) showed that school leaders must, first, determine digital governance challenges, especially in a developing economy such as the Philippines, to deal with a complex digital system.

The ability of a person to influence technology assimilation in industries is called technological leadership. The technological leadership of ICT governances refers to the capacity of a leader to control the uses and adoption of our classrooms and schools. It means considering how technology can increase the efficiency of the teaching-learning process (Oberer & Erkollar, 2018). Visionary leadership and proactive involvement greatly enhance the effectiveness of ICT initiatives (Andersen, 2018). In the Philippine context, it was found that there's a significant correlation between teachers' usage of ICT in the classroom and the school heads' technological leadership, indicating that good leadership has a direct impact on classroom procedures (Reganon, 2023; Alayan, 2022).

ICT management includes the methodical planning, implementing, maintaining, and assessing of educational technology resources (Matthew et al., 2022). Gomina (2022) stated that guaranteed resilient infrastructure qualities such as functionality, user assistance, and alignment of technology with educational objectives is essential for seamless digital integration. Examples of this include secure data systems, dependable internet connection, and modern technology. Technical assistance holds equal importance; Tariq et al., (2024) highlighted the need for specialized IT teams that can respond to hardware and software issues instantly, reducing interruptions to instruction.

The elements of ICT management that are derived from UNESCO's ICT Integration Model include aspects such as strategic policy planning, leadership and governance, teacher competency building, and infrastructure development (UNESCO, 2019). In fact, it highlights that the very basis of the effective management of ICT and the alignment of technological resources with the educational goals consists of planning, monitoring, and continuous professional development (UNESCO, 2018). All of these components work together to guarantee that digital technologies are used in administration, education, and learning in a way that is ecologically friendly. The planning and the policies are equally crucial. USAID (2020) emphasized that in order to ensure sustainability and uniformity, planning must be centralized and ICT rules must be clear. Last but not least, methods for monitoring and evaluating (M&E) the effects of ICT actions must be established. Accountability is reinforced in school administration, and fact-based monitoring and evaluation mechanisms are supported in decision-making (IJRISS, 2023).

According to Raman and Thannimalai (2018), visionary planning, policy crafting, and cultivating a mindset that fosters and encourage technological growth are all components of effective ICT leadership. The integration of technology in teaching and learning can be effectively done through the involvement of school administrators in initiatives for ICT development. Along with this, the clear and

strategic directions for ICT integration in schools offered by them would significantly aid in the integration (Christensen et al., 2018; Blau and Shamie-Inbal, 2017; Mihai and Nieuwenhuis, 2015). To enhance ICT integration in public schools in the Philippines, the Department of Education (DepEd) has initiated the Digital Rise Program, the DepEd Computerization Program (DCP), and the ICT for Education project. Nonetheless, the leadership behavior of school heads affects the effectiveness of the initiatives implemented. School administrators providing strong technical leadership is beneficial for effective ICT integration by the teachers. Such integration effectively enhances student achievement (Ama'r & Eleyan, 2022; Alvarez, 2020; Raman, 2019). Moreover, having clear ICT governance frameworks in schools facilitates better resource allocation and decision-making, both of which are important in sustaining of ICT programs (DepEd, 2021).

Digital Competence and Capacity Building

How school administrators are digitally competent impacts how ICT is integrated in the classroom (Blau & Shamir-Inbal, 2017). According to Wiyono et al. (2024), various frameworks across the world such as the Digital Competence Framework for Educators, developed by the European Commission, have emphasized that school leaders need to have the essential digitals kills to support and lead technology-enhanced learning environments.

In education, dynamic and emerging, school leaders' professional growth and digital competency contribute to the successful leadership of the digitalization of general education institutions (Caneva & Pulfrey, 2023; Gordashnikova, 2021). The skill of school principals to efficiently use technology affects not only technological usage in the school, but also the preparedness of the school to address the needs of the digital age (Karakose et al., 2021; Sheniger, 2019). Moreover, technology leadership is identified as a key element of the school leadership, for example, in the study by Karaköse and Tülübas (2023), it was recorded that the distributed leadership models give the power to the teachers to cooperatively handle the technology innovations. Teachers and school administrators jointly plan how the ICT will be integrated into curriculum and administrative work.

Studies in the Philippines have highlighted the challenges school leaders face as they try to employ digital governance. Hanisch et al. (2023) claim that school administrators inevitably fail to successfully transition to a digital environment when they lack experience and training systems to assist them in these digital endeavors. Similarly, Schenk and Dolata (2020) stressed that professional development must be specific and concentrated to ensure school administrators have relevant knowledge to lead digital transformations. The digital proficiency of long-serving teachers as stated by Dioquino and Paglinawan (2024) is influenced by their willingness to acquire technical knowledge and use available resources for development. According to Kashaka (2025), school administrators can't just be digitally literate-- they must also create an atmosphere for their staff to learn and be flexible.

It has been noted that ongoing professional development must be provided for school administrators in the area of ICT. Luecha et al. (2022) indicate that digital leadership training programs should be created for school administrators to enhance communication, decision-making, and teaching in the digital environment. The programs for digital leadership should emphasize the blending of leadership traits with digital competencies. According to Alvarez (2020), the higher the digital competence of school administrators, the more likely they are to adopt ICT programmes and assist teachers in using ICT in the classroom.

Enablers and Barriers to Digital Transformation

The success of the digital transformation in education depends on facilitators and barriers. Leadership is the social influence that minimizes the effort of others and maximums the effort of others to reach the goal. One of the most significant enablers, it is said to be. The ability of leaders on an essential level to articulate an optimal vision, acquire resources, and encourage innovation (Leithwood et al., 2020).

According to Rodrigo (2016), although many countries of the world implement ICT integration in their national schools, there are specific challenges and opportunities to

manage this ICT integration process successfully. The lack of sufficient digital infrastructure remains, predominantly, the major hurdle in the Philippines, particularly in the remote and hinterland areas, according to Lambunao (2024). A number of public schools lack improved technological learning environments due to the exclusion of advanced technologies, reliable internet, as well as nearby professional support like what those private schools have who are able to access technological learning environments (Tomaro & Mutiarin, 2018).

Another important enabling factor is infrastructure readiness. OECD guidelines (2021) explain that schools with secure software, updated hardware, and stable internet connectivity find it easier to go digital. In the same way, the provision of infrastructure comprising electronic devices and digital content by the government becomes an enabler for equitable access.

There are many reasons that people resist change. According to Ertmer and Ottenbreit-Leftwich (2020), school teachers and administrators implement new technologies only if there is no fear or lack of confidence among them. Tackling these attitudes means planning inclusively, training thoroughly and acknowledging and supporting teacher agency more.

Martinez (2025) said that the most common hindrances to efficient ICT management are budget constraints. The limited funding inhibits a lot of schools from buying new hardware as well as maintaining the present ICT facilities. Because of that, they already have underutilized or outdated hardware (Tembrevilla, 2020). This problem is worsened by logistical and bureaucratic inefficiencies, like the missing ₱9 billion worth of unloaded laptops and digital equipment reported in the Department of Education's budget deliberation for 2025 (Martinez, 2025). Delays in ICT programs meant to add impact in using technology and the demoralization of teachers who are willing to innovate (Köysüren, & Deryakulu, 2017).

Social class inequality occurs often. When poorer students do not have devices and access to the internet, further inequities are created (Van Dijk, 2020). Programs that provide digital subsidies, community access centers, and public Wi-Fi can help in bridging the digital divide.

The absence of comprehensive professional development for educators and school administrators is another obstacle to ICT integration, in addition to issues with funding and infrastructure (Amir, 2023). According to Cabunoc and Ubayubay (2024), a large number of educators lack the necessary training to acquire the digital competencies needed for contemporary instruction. Additionally, instructors' ICT skills were influenced by their age, previous teaching experience, and general attitude toward technology, which rendered one-size-fits-all training methods inefficient (Porter, 2025). Furthermore, school heads are required to set an example and promote digital transformation, making leadership a crucial component of ICT administration (Balu & Shamir-Inbal, 2023). However, a lack of administrative assistance, conflicting agendas, and deficiencies in their own ICT expertise frequently limit their ability to spearhead digital change (Singun, 2025). School heads in Camarines Norte were able to overcome institutional barriers and more successfully implement ICT strategies with the support of leadership interventions such as community collaborations and capacity-building workshops (Macale & Abanto, 2024).

Digital literacy instruction, instructional design and reflective teaching practice training enables teachers to effectively use technology (Marin & Cataneda, 2024). Training programs are professionals' development that enhances knowledge and skills that are crucial for transformation. Also, partnerships involving ongoing support, peer mentoring and communities of practice further sustain teacher learning and innovation.

Nevertheless, there are also various factors that make the management of ICTs much easier. Globe Telecom has donated AI-enabled tablets to selected public schools across the country. By establishing a corporate partnership with the business community, students were able to gain access to gadgets for studying such as tablets. Rodrigo (2016) asserts that this type of partnership between the private and public sectors addresses context-specific resource gaps.

When appropriately monitored, government policies can also act as enablers. A signif-

icant move toward centralized digital governance and the coordination of national ICT projects across sectors, including education, was the creation of the Department of Information and Communications Technology (DICT) in 2016. The existence of these institutions improves accountability and provides a venue for the ongoing planning and execution of digital education (Nuncio, 2020).

Policy frameworks and governance structures provide the necessary backbone for transformation. National policies such as the DepEd ICT Strategic Plan (2020) in the Philippines outline goals, strategies, and accountability measures that guide digital integration at the school level. Governance makes sure that policies are intended and carry out.

Therefore, Alda et al. (2022) noted that school-based capacity-building programs that fit with the local environment are critical facilitators to ICT management. A study of Muntinlupa National High School shows that teachers who received special instruction regarding technological resources successfully and on a regular basis use technologies in their lesson plans (Del Mundo, 2022). To ensure that public schools continue using ICT, these findings stress the need for continuing, targeted, and useful training programs (Cabunoc & Ubayubay, 2024).

In addressing privacy of data, using intelligence, and health, schools are utilizing technology and online learning daily, and it is essential to keep student data safe. According to Livingstone and Stoilova (2019), having a concrete policy, parental involvement, and digital literacy programs can help students stay safe online.

Synthesis of the Literature

The reviewed literature on digital transformation in education shows that it encompasses different dimensions, including technological, pedagogical, organizational, and cultural. Because technology does not cover everything, digital transformation activities are system changes. According to Bond et al. (2018) and Zhu and He (2021), it entails a range of activities and changes to systems, rather than just technology. In addition, it focuses on bringing infrastructure, teacher capacity and institutional leadership in sync with changing learner needs. The Philippines' basic education sector facing the challenge of digital transformation.

In order for twenty first century learners to experience individualized, interactive and skills development learning, ICT utilization is necessary within the basic education. Access to technology does not guarantee that ICT integration is significant. The professional development needs to support curriculum-aligned, pedagogically-sound practice (UNESCO, 2021). Teachers need professional development and structural support to ensure that they build their technical literacy and confidence.

According to OECD (2021), strong leadership, infrastructure readiness, continuous professional development, and coherent policy frameworks are enablers of. Likewise, digital inequality, possible resistance to change and data privacy are barriers to the sustainability of digital initiatives. Any problems in education can be addressed through a whole-school approach anchored on inclusion. This should pay attention to the socio-technical, pedagogical, and organizational dimensions of transformation. According to the literature, the digital transformation of secondary education is feasible. At the national and school levels, education systems should support the strategic alignment of technology, pedagogy and policy among them.

Framework of the Study

This study investigated how public secondary schools in the Schools Division Office of Nueva Ecija navigate digital transformation through the exploration of their ICT – related best practices of digital transformation. This study was hinged on the premise that digital transformation of education is more than technology use and that for a school to digitally transform, a strategic and systematic convergence of infrastructure, leadership, teaching practice, professional learning, and sustainable digital culture is required.

The study adapted and combined concepts existing ICT frameworks such as the "Digital Maturity Model for Education," the "UNESCO ICT Competency Framework for Teachers" (ICT-CFT), and "European Framework for the Digital Competence of Educators" (DigCompEdu). These international frameworks prove that individual teacher

competency is not sufficient for schools to progressively digitize their teaching-learning practices. Schools must align their structures and practices strategically.

The framework of this study was structured around five interrelated dimensions:

ICT Infrastructure and Management. This assessed how ICT resources, such as facilities and tools, are allocated equally and effectively in schools. The study looked at how the presence of ICT infrastructure and related materials can facilitate the digital transformation of school across all operations.

Leadership and Governance. This is pursuant to the thought that digital transformation also has a huge thing to do with leadership and governance. This dimension explored how school leaders and policymakers drive digital transformation.

Teaching and Learning Practices. This dimension sought to investigate how digital tools are integrated into pedagogy and curriculum leading to the identification of schools' ICT best practices on ICT integration. It looked at the degree at which ICT is utilized to support meaningful learning environments.

Professional Development. The digital readiness of educators hinges on ongoing training and support. This dimension focused on the availability, quality, and impact of professional learning opportunities aimed at improving digital pedagogical skills.

Digital Culture and Sustainability. Beyond tools and training, transformation required a shift in school culture—toward openness to innovation, collaborative learning, digitized workflow, and long-term sustainability. This dimension examined the collective school community's attitudes and institutional commitment to digital evolution.

Schools were classified based on their performance across the five dimensions. The framework guided the in-depth case studies of those schools recognized as "Optimized" or digitally transformed schools, exploring how these dimensions interact in real-world contexts to drive digital transformation.

By applying this conceptual framework, the study's objective was to provide an intensive analysis of how secondary schools were navigating the path toward digital transformation through determining the best practices of these schools have.

Research Questions

This study aimed to explore the digital transformation in public secondary education schools within the Schools Division Office of Nueva Ecija, Philippines. Specifically, it sought to answer the following research questions:

1. What best practices are observed in schools classified under the "Optimized" level of digital transformation?

Methods

This study employed a case study method to explore the digital transformation of the four public secondary schools who were determined to be "Optimized" in terms of digital transformation within the Schools Division Office of Nueva Ecija. According to Yin (2018), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth within its real-world context, especially when contextual conditions are relevant to understanding the phenomenon being examined. The multiple-case design allowed the researcher to examine the phenomenon across multiple cases. By using a multiple-case design, the researcher was able to examine the different infrastructure, practices, leadership, capacity-building efforts and institutional culture within the bounded cases by gathering data through observation, interview, and school documents. These three data sources were triangulated through the cross – case analysis to determine the best practices of digital transformation.

Research Locale and Sampling Procedure

A purposive multi-stakeholder sample comprising a total of 13 informants across the four optimized cases was engaged. This multi-stakeholder matrix consisted of School Heads, ICT Coordinators, Teachers, and Students. To ensure absolute methodological transparency and validity, data triangulation was systematically executed by cross-checking non-participant observation checklists, semi-structured interview verbatim transcripts, and institutional documents (including School Improvement Plans [SIP] and Annual Implementation Plans [AIP]).

Within each case, infrastructure, school operations, as well as digital culture and instructional practices applying ICT were observed to understand how digital transformation was implemented. School heads, ICT coordinators, teachers, and students, were interviewed per case to gather multi-stakeholder perspectives. Relevant documents were also reviewed to provide evidence for each case.

Table 1 shows the profile of the four cases subjected to the study.

Table 1. Profile of Cases

School	Level of Digital Transformation	ICT – Related Awards	Informants	Documents
School A	Optimized (Mean = 4.00)	Awards in Technical Drafting, and Robotics Merit of Excellence	4	School Improvement Plan Annual Implementation Plan Lesson Plan ICT Inventory Recognition Certificate
School B	Optimized (Mean = 4.00)	Awards in Media Production Merit of Excellence	3	School Improvement Plan Annual Implementation Plan Lesson Plan ICT Inventory Recognition Certificate
School C	Optimized (Mean = 4.00)	Awards in Research and Innovation Merit of Excellence	3	School Improvement Plan Annual Implementation Plan Lesson Plan ICT Inventory Action Plan Recognition Certificate
School D	Optimized (Mean = 4.00)	Awards in Technical Drafting, Innovation, and Robotics Merit of Excellence	3	School Improvement Plan Annual Implementation Plan Lesson Plan Expenditure Form Action Plan Recognition Certificate
			Total: 13	

For the purpose of maintaining confidentiality and anonymity of the institutions and persons that participated in this study, the participating schools will be referred to by the pseudonyms: School A, School B, School C and School D as they were randomly given to the participating institutions for the rest of this paper. As displayed in Table 1, all four schools were selected owing to the high digital transformation level present in each domain.

Research Instruments

To achieve bountiful data, this study utilized multiple instruments to ensure comprehensive data collection such as observation checklist, interview, school documents, and photographic evidence. These various qualitative data sources were triangulated in a cross-case analysis to determine the best practices of digital transformation. Together, these multiple instruments provide a comprehensive data

set which adds credibility to the findings and richness to the analysis.

a. Document and School Records. As a formal source of data, relevant school documents were collected and reviewed. These include ICT development plans, School Improvement Plans (SIPs), Annual Implementation Plans (AIPs), Training records and certificates, and reports from digital platforms.

b. Photographic Evidence. To provide evidence of actual ICT integration, the researcher collected artifacts such as digital teaching-learning materials, school websites or social media platforms, screenshots or sample outputs from digital systems, and student projects related to digital or media literacy.

c. Semi-Structured Interview. The researcher, with the aid of research consultants, constructed a semi-structured interview guide that is crafted to capture the lived experiences of school stakeholders in terms of ICT in education. Questions are into five domains aligned with the foundational framework: ICT infrastructure and management, leadership and governance; teaching and learning; capacity building and professional development; and digital culture and sustainability.

d. Observation Checklist. When the researcher went to the institution, non-participant observations were done to observe evidence on the schools' presence and use of ICT in instruction and administrative operation. Furthermore, during observation, the researcher was guided by a checklist.

Data Gathering Procedures

An official request to conduct the study was submitted to the Schools Division Superintendent. Once permit was obtained, a subset of four schools identified as "Optimized" in terms of digital Transformation were selected for in-depth case studies. These schools were chosen through purposive sampling, based on their survey scores and willingness to participate in the case study.

On-site observation guided by an observation checklist and supported by the gathered of photo artifacts were first conducted. This was followed by semi-structured interviews with key informants from each school who include school heads, ICT coordinators, teachers and students. The interview schedules were made upon consultation with participants and made sure to observe health and safety measures. Interviews were conducted physically and followed an interview guide which had been validated. All interviews were audio-recorded with participants consenting and transcribed verbatim. Furthermore, the researcher gathered document records which included the School Improvement Plan, Annual Implementation Plan, lesson plans, etc.

All transcripts and documents were kept in a password protected file on a computer to adhere to confidentiality as well as data integrity. The use of multi-source data collection aimed for triangulation so as to ensure the depth, trustworthiness, and the credibility of the findings.

Data Management and Analysis

Cross-case analysis was employed to process the data found from observation, interview, and document of the multiple cases. These data were triangulated to enable an in-depth analysis focused on determining the commonalities and differences on best practices of the cases that allowed public secondary schools to successfully adapt to digital transformation. Data from sources were cross-checked to identify recurring patterns, similarities, and differences between cases, which strengthened the credibility and validity of the findings. By using this method, the researcher was able to move beyond individual understanding of the cases and develop broader theoretical insights from the collective data. Through systematic comparison, the researcher identified repeating concepts and contextual variations that influence outcomes across cases.

Results and Discussion

Best practices observed in schools classified under the "Optimized" level of digital transformation

Case 1: School A. School A is a large rural public secondary school that has been serving its community for 30 years. In addition to its regular academic programs, School A offers several specialized curricula including: Special Program in Information and Communications Technology (ICT), Science, Technology, and Engineering (STE), Special Program in Journalism, and Special Program in the Arts.



Figure 1. School A as Recipient of Merit of Excellence

School A also receives recognition for its institutional performance. The Schools Division Office of Nueva Ecija honored the school with the Merit of Excellence just last 2025. Moreover, the institution regularly participates in the division's Technolympics and has received awards in robotics and Technical Drafting.

Innovative Practices

At School A, digital technologies are integrated into the provision of their daily classroom instructions. Evidence presented from observation provided illustrations where the use of digital tools formed part of normal classroom instruction. One student shared,

"They use tools like ClassPoint, Google Classroom, Google Forms like that, so it becomes more fun."

(Gumagamit po sila ng mga tools like ClassPoint, Google Classroom, mga Google Forms ganyan. Kaya din po mas nagiging masaya po.)

Learning activities were also often designed to be interactive through using online game-based quizzes. One participant shared, *"We use online game or quiz...."*



Figure 2. School A Learners Accomplishing an Online Quiz

The previous photo showing School A learners while using interactive digital tool proves the school's use of interactive applications. According to Artal–Sevil et al. (2018), the use of ICT in the classroom encourages interactive education that enhances

students' understanding and engagement in learning.

One best practice of school A also centers on their focus on project-based experiential learning. Due to the digital usage, the students are able to even create and not just consume. KI2 described a Grade 10 research project involving website development:

"For our research, I am making a website… about barangay transparency project monitoring."

(Sa research po namin, meron po akong ginagawang website… tungkol po sya sa barangay transparency project monitoring.)

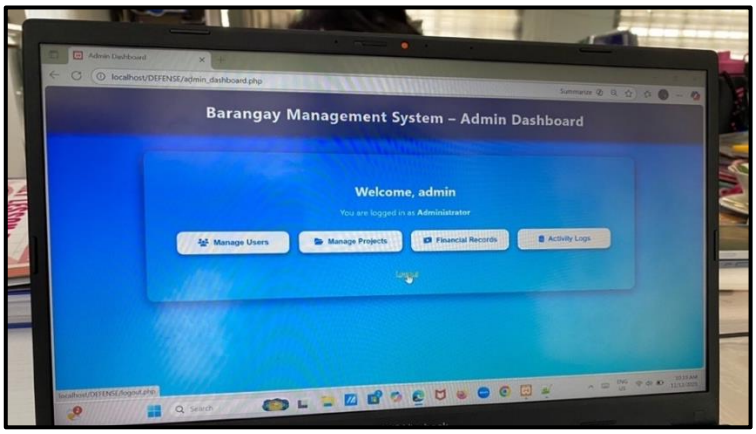

Figure 3. School A Student Project – Based Research Output

Through the cyberculture generated in school A, their students become researchers and innovators which proves what Kalyani (2024) had said that student learning outcomes can improve when there is an innovative and creative school culture. Likewise, school documents promoted *"Project-Based Learning: Encourage hands-on, real-world applications."*

At School A, the development of teachers also benefits from a system of peer mentoring, where teachers support one another in the development of digital capabilities. KI1 explained:

"We do peer mentoring here. My colleagues often come here when they needed… Like what to do in PowerPoint, Excel."

(Peer mentoring kami dito. Madalas pumupunta dito yung mga co-teachers ko kapag kailangan nila… Ano yung gagawin sa PowerPoint, Excel.)



Figure 4. School A Post – Training Technical Assistance

Training, mentoring and sharing information and materials to support teachers' readiness for change to digital school increased the acquisition and communication of new knowledge in School A. This is pursuant to what Mane (2025) said that trainings and mentorship programs make educators more prepared for ICT integration.

Another observed best practice in School A has to do with the digitization of their processes. The photo evidence below shows the dashboards of school-based learning management systems used by School B. In the photo, the number of enrollees in SPICT per Grade level can be seen.

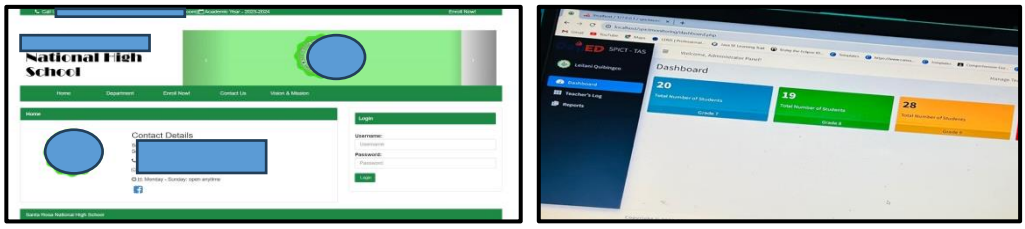

Figure 5. School A Learning Management System

Documents also prove that school processes are also strengthened through *"Automate Processes by implementing digital tools for record-keeping, reporting and communication."* Moreover, School A also makes use of communication platforms to disseminate announcements. The photo to follow shows that School A has an active social media page where announcements concerning school activities were posted.

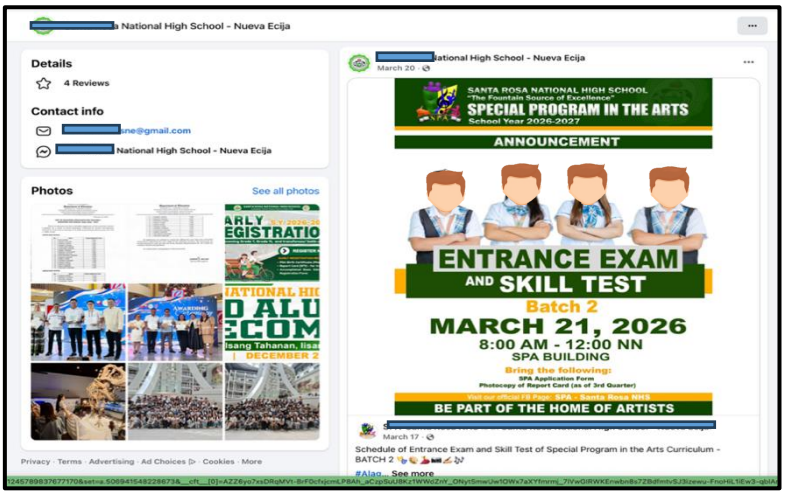

Figure 6. School A Digital Communication Platform

These practices suggest that School A has leveraged the integration of ICT to extend into its school's administrative systems. With integrated ICT systems, and automation of processes, the digitization of operations can lead to the digital transformation of schools (Petterson, 2021).

Lastly accessibility was also intentionally promoted by allowing students to use ICT facilities beyond classroom schedules. KI1 said,

"It's okay for them to use the computers even during breaktime… This is also accessible to the teachers."

(Okay lang sila mag-computer kahit breaktime… Accessible din po ito sa mga teachers.)

This exemplifies an integrated practice that believes technology for learning should be available to every student. Another strength of

ICT network of the school is the internet connectivity. The observation confirmed that learning spaces were equipped with WIFI facilities. Interview responses described deliberate efforts to maintain reliable internet access across the ICT building. KI1 stated:

> *All those internet is available for all students here in the ICT building so if you can see they all have their own routers."*
>
> *(Lahat ng internet na yan available sa lahat ng bata saka dito sa ICT building kaya kung makikita mo mam may sari-sarili silang router.)*

These all demonstrate that network accessibility is an institutional priority for School A. This finding aligns closely with documentary evidence outlines an initiative on *"Digital Inclusion: Ensure equal access to device and internet connectivity,"* With these, it is evident that School A recognizes the necessity of internet access in providing technology-assisted instruction. This further aligns with what Debasu and Yitawew (2024) said that ensuring educational infrastructure is accessible is important to creating inclusive learning environments.

Case 2: School B. School B is a reputable public secondary school that has been in existence for 80 years. The school has also regularly updated its curriculum offers to cater to the varied interests of students. Interested students in this school can acquire skills in sports, ICT, STE and journalism through their offered special programs.



Figure 7. School B Recognitions for Exemplary School Operation

School B stands out due to its institutional reputation and exemplary operations as proven by the multiple awards received by the school. Back in 2024, it has been recognized as one of the Best MATATAG Schools. In 2025, it was recognized as the Best Implementing School in Nueva Ecija. In addition, School B is also a consistent awardee of Merit of Excellence.

Innovative Practices

In School B, the utilization of digital tool and its integration to lessons occur on a daily basis. Teachers at School B expressed that they often use online applications and create multimedia presentations, so lessons would be more engaging and accessible. KI9 explained: *"In my workload? How do I use ICT? For example... using PowerPoint. Another thing is using different applications... that leverage online availability... having internet is really not that much of an issue now."*

In relation, School B also showed frequent use of collaborative ICT tools such as Kahoot or Mentimeter to improve student engagement. The photo artifact below proves the use of a collaborative digital tool as applied in an ESP class. This evidence reflects the teacher's use of ICT to create an engaging and learner-centered classroom environment.

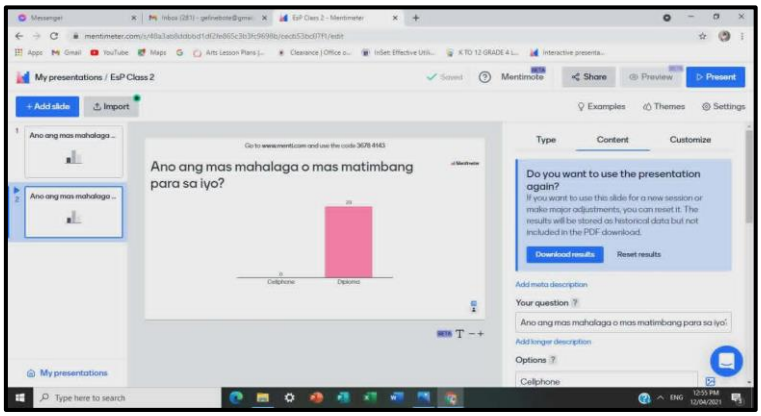

Figure 8. SDO – School B ESP Teacher Mentimeter Material Utilized in Class

A document extract also further confirms this collaborative integration of technology in the report stating: *"Use of collaborative learning strategies to promote student-centered instructions"* All in all, these examples illustrate how ICT tools are used by School B, not only to present information but also to create immersive and participatory learning experiences which is relative to what Jeet and Pant (2023) said that instruction assisted by technology enhances learner engagement by offering immersive educational experiences that enhance collaboration and critical thinking.

In connection, School B focuses on output-based digital experiences that enhance their students ICT capabilities. The photo artifact below, shows students of SPICT as they present their research project that displayed their collaborative programming work.

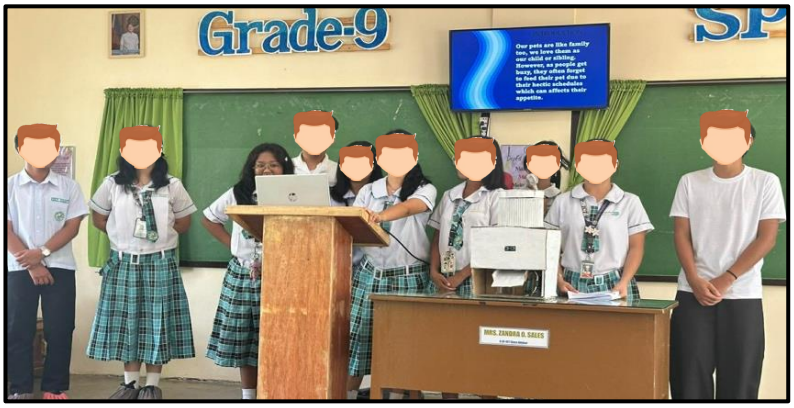

Figure 9. School B Learners Presenting their Programming Project

Similarly, documentary evidence identified an institutional initiative designed *"to improve student competencies in programming, digital design, and hardware servicing."* All these organized educational activities allow students to gain access to real-life experiences.

Aside from providing hands-on experiences, teachers also utilize assessment tools. And, they are also identified to streamline the dissemination of materials and submission of learner outputs through the use of online learning platforms. The photo artifact attached shows the use of digital systems as applied in a regular class.



Figure 10. School B Use of Digital Systems in Teaching and Learning

All in all, these findings indicate that School B's teaching and learning practices move beyond content delivery by immersing students in applied digital tasks. ICT-assisted learning provides opportunities for personalized instruction and experiential learning through the use of digital technologies and online platforms (Bindu, 2016).

Another best practice of School B is evident in their of mentoring mechanisms, particularly through the provision of technical assistance by school leaders. The photo artifact below shows a SDO – NE official providing a technical assistance during monitoring visit to School B.

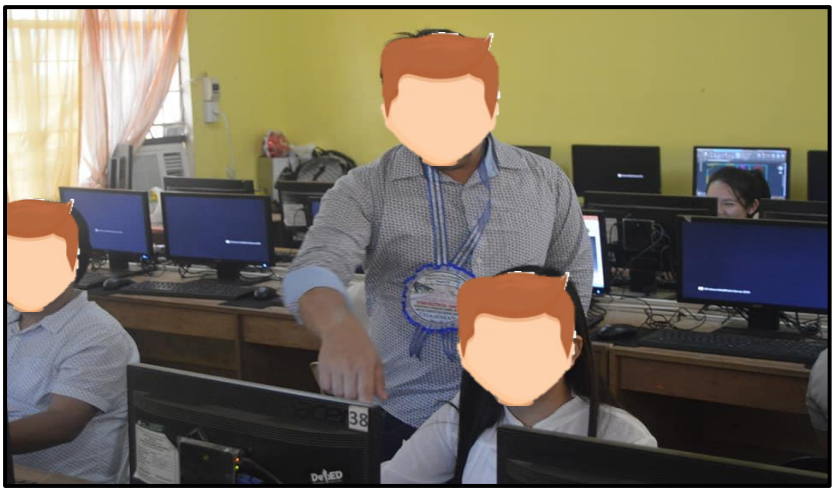

Figure 11. SDO - NE Supervisors Providing Technical Assistance to School B Teachers

This finding portrays School B's professional development as a collaborative process supported by the expertise and guidance provided by school leaders. When schools encourage collaborative professional development, stronger professional learning communities arise (Harvey & Teledahl, 2022).

Another observed best practice of this school is related to the digitization of school processes and the presence of an institutionalized communication platform.

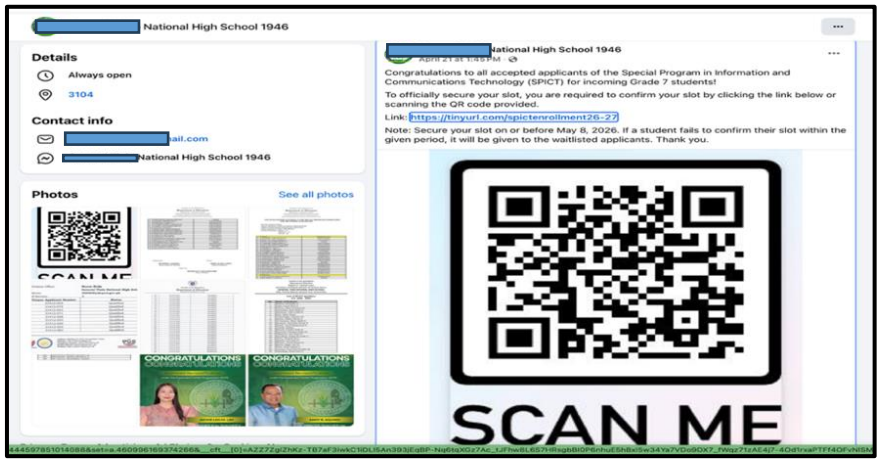

Figure 12. School B Digitized Admission to School Special Program

This observation is supported by the photo artifact showing that the enrollment and admission process of School B for its special programs are already digitized through the use of Google Forms and QR codes. As seen, this information is disseminated through the school's official social media page. These pieces of evidence show that School B's usage of ICT extends beyond just teaching and learning and instead seeps in the school's other areas of operations. According to Nyambane and Nzuki (2019), the integration of ICT in school operations improves program efficiency.

In terms of access, internet connectivity is found to be another essential component to the school, as it is evident in the photo provided, where internet connection is instrumental for the conduct of School B's Intramurals activity.



Figure 13. School B Learners Utilizing Internet Connectivity for E-Mobile Competition during Intramurals

As KI9 said in his interview, *"One of the biggest advancements… is… having our own internet connection."* Documentary evidence supports this through the extract under governance performance indicators where it was shown that the *"school has school wide internet access."* These findings demonstrate that internet infrastructure in School B is recognized as a critical component that aids teaching and learning process.

Given these pieces of evidence, it could be said that School B possesses reliable network and access that support and enable the use of instructional technology, and that this availability sustains and strengthens their digital transformation that is already in motion. As stated by Mhlanga (2024), education's digital

transformation relies heavily on the availability of reliable ICT infrastructure and equipment.

Case 3: School C. School C, a medium-sized rural public secondary school with 33 years of history. The school's dedication to technology-oriented education is demonstrated by the unique learning opportunities it offers through its Science, Technology, and Engineering (STE) and Special Program in ICT (SPICT), in addition to its Junior High School and Senior High School curriculum.



Figure 14. School C Receiving Merit of Excellence

Upon observing School C, it became clear that the institution places a high priority on professional development and ICT infrastructure. These advantages, together with its receipt of Merit of Excellence, establish School C as a growing organization that actively fosters professional development and innovation in a rural educational environment.

Innovative Practices

The results of observations in this school revealed that teachers use a variety of digital materials to deliver their lessons. The usage of digital devices like projector, television, presentation slide and more were observed as it engages learners and helps teachers with the material presentation.

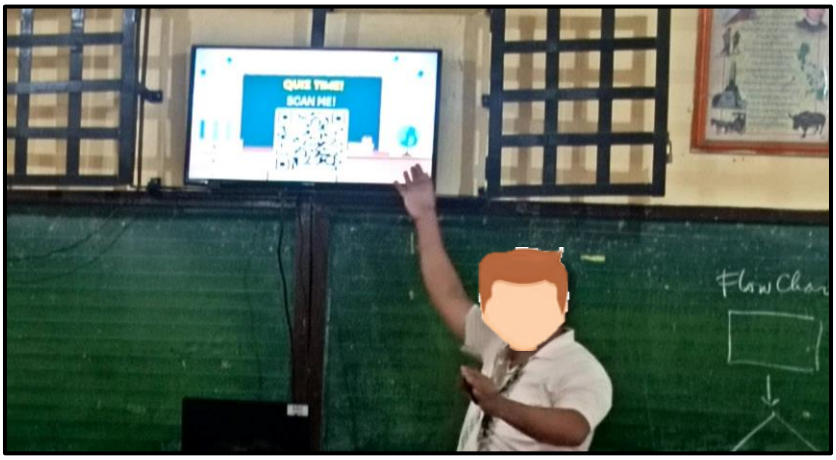

Figure 15. School C Teacher Using Digital Assessment Accessed Via QR Code

As revealed through interview, the teachers use of interactive apps and websites to enhance student participation, is considered a one of School C's best practices. KI6 shared,

"Our best practices… would be our usage of Kahoot and other online apps. We can say that those were used throughout the year."

(Yung mga best practices… yung mga paggamit ng ng Kahoot, nung mga online apps. Yun ay pwede nating sabihin na ginagamit nila throughout the year ganun.)

The statement shows that teachers in School C use digital tools along with gamified learning materials for classroom teaching. According to Jaiswal (2020), using educational technology in the classroom can improve teaching delivery and students' academic performance.

Additionally, teaching practices in School C also emphasize hands-on learning supported by technology-enhanced instruction. Documents indicate that learners engage in practical activities as stated, *"The learners do hands-on learning through the activity where they are required to measure and cut a specific length of UTP cable…"* and further supported by is the photo of School C learner doing computer hardware servicing.



Figure 16. School C Students Doing Computer Hardware Servicing

Another thing, students are also encouraged to collaborate through ICT-supported activities and collaborative learning tool pursuant to the documentary evidence corroborating: *"Use of collaborative learning strategies to promote student-centered instructions."* Further evidence of this is a photo artifact showing that students at school C conducted an online symposium exercise where they collaborated and shared technology to execute an online activity.

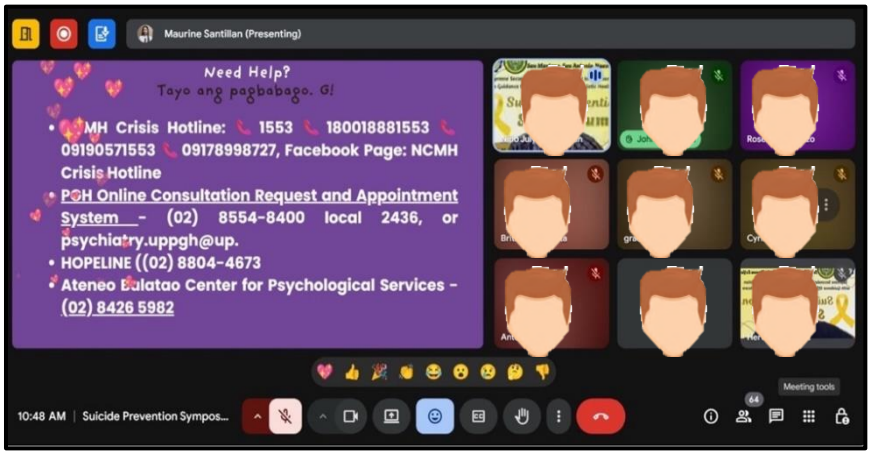

Figure 17. School C Students Holding an Online Symposium as a Performance Task

To sum up, it can be observed that School C's teaching-learning practices happens in a technology-supported learning environment with strong strategies on ICT integration, paperless assessment and hands-on learning. Combining ICT in education strengthens the capacity for technology-enabled learning environments to support digital transformation 21st century learning competencies (Verdonck et al., 2019).

Another notable practice of School C is their conduct of peer mentoring. It is also observed that School C's professional development extends beyond formal seminars into school-based support systems like peer tutoring among teachers, where the technologically-skilled personnel provide assistance to colleagues encountering challenges in using digital tools. KI5 explained,

"What you saw earlier, the peer mentoring… I could say that's one of the best practices here. If there's a tool that a teacher don't know how to use or if they encounter slight problems with their gadgets, teachers would help each other."

(Yung nakita mo kanina, yung peer tutoring… masasabi kong isa yon sa mga best practices dito. Kapagka merong hindi alam gamitin na application yung teacher o medyo nagkakaproblema sa gadget, tulungan ang mga teachers..)

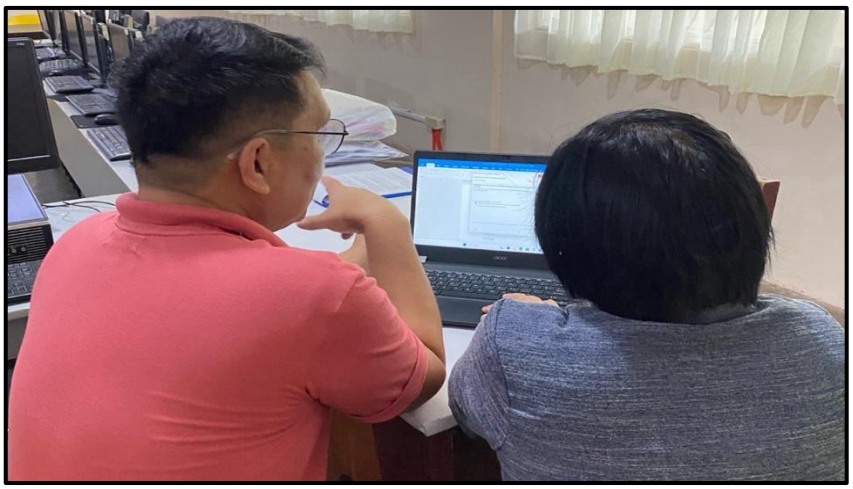

Figure 18. School C ICT Coordinator Providing Peer Mentoring

The photo evidence reflects what was being claimed by the narrative. Document extracts likewise validate the school's direction on professional growth. School records also details *"Project SYNERGY establishes a framework that facilitates the sharing of resources, guidance, and support among various parties."* This shows the recognition of professional learning engagement as part of teacher development. All these shows the importance School C has placed in digital competency development as it aligns with what Caneva and Pulfrey (2023) said about the significance of professional development.

Case 4: School D. School D is a large rural secondary school with an impressive educational history of eighty-two years. Over the years, this institution has developed into an educational institution responsive toward the academic needs of the learners and has been offering specialized curriculum including Special Program in ICT.

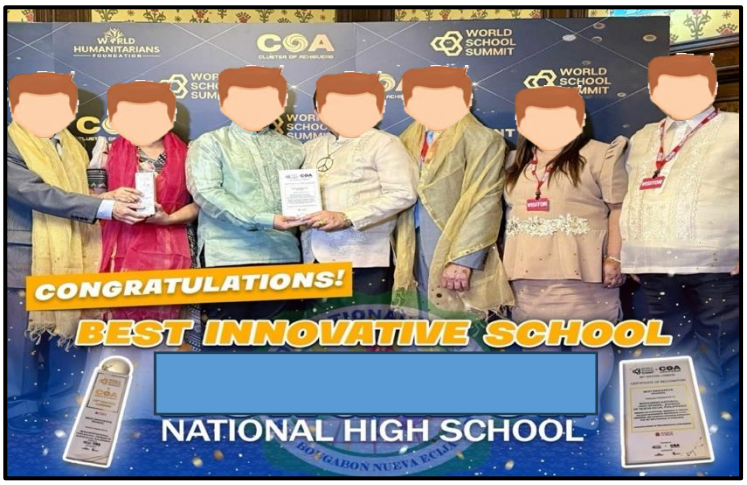

Figure 19. School D Receiving International Award as Best Innovative

What makes School D particularly standout is its strong reputation for excellence within the Schools Division Office of Nueva Ecija where it routinely ranks among the division's top-performing public schools. Moreover, it has been recognized internationally. The World School Summit, in collaboration with the Cluster of Achievers in London, awarded it the title of "Best Innovative School." Besides some international recognitions, School D has consistently won the Merit of Excellence Award locally that actually solidifies its standing as a school that prioritizes innovation and ongoing institutional development.

Innovative Practices

At School D, with a highly technologically - assisted experience on teaching and learning, the use of digital tools, interactive platforms, application-based learning and innovation-based outcomes have become part of the school's classroom daily experience. Observation supports this through the photo documentation where a teacher actively utilizes televisions during instruction, which then shows a multimedia-supported instruction class session.



Figure 20. Class Session Utilizing EdTech. in School D

Given the availability of materials, it was made possible for School D to handle their sessions with the use of audio-visual aids as well as use gamified leaning tools. Below is another photo showcasing the same class using WayGround or Quizziz.



Figure 21. School D Class Session Utilizing WayGround (Quizziz)

In addition, a participant recounts her use of online applications, including giving digital assessments. Observation evidence shows School D's use of ZipGrade for digital checking of quizzes KI13 shared,

"We are all using ZipGrade. So we we do assessments, we can give results to the students right away."

(Lahat po kami naka-ZipGrade na. Pagka-assement namin, makaka-pagbigay na kami agad ng result dun sa mga bata..)

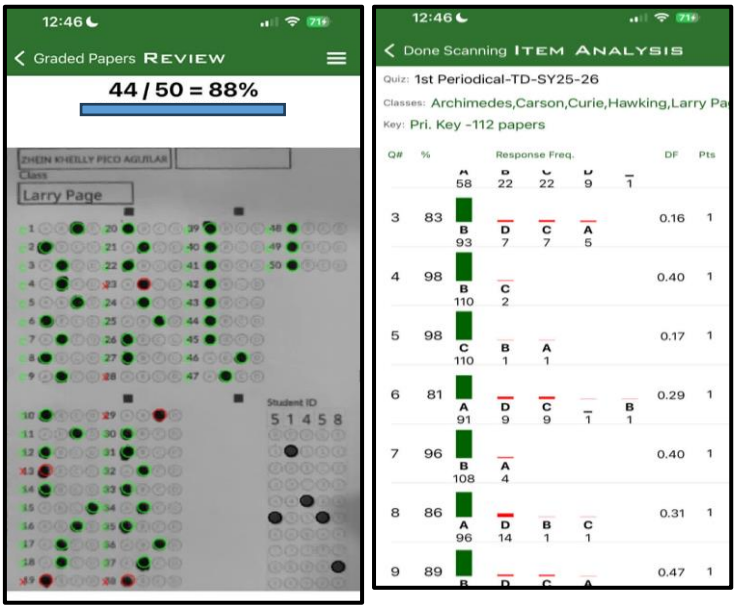

Figure 22. School D Digital Checking of Student Assessment

Observation evidence also highlights the school's strong practice inclined on producing project - based outputs especially through research and innovation. Photo artifact shows student research defenses and exhibit of their programming output.



Figure 23. School D Learners Presenting Their Program ClassCheck

Through this observation, it can be said that teaching and learning practices in School D reflect a digitally advanced instructional environment where technology supports lesson delivery, assessment, collaboration, creativity, and innovation. These all account that utilizing ICT can help implement learner-centered instruction that helps improve digital literacy of students (Verma et al., 2025).

Another remarkable practice of School D is their digitization of school processes. School documents reflect such initiatives through statements *"Support school digital records and data management"* and *"Assist in encoding, updating LIS, EBEIS, and other School Information Systems*. This practice was especially evident in their practice of integrating ICT in their school-based competitions such as essay writing during their Buwan ng Wika celebration.

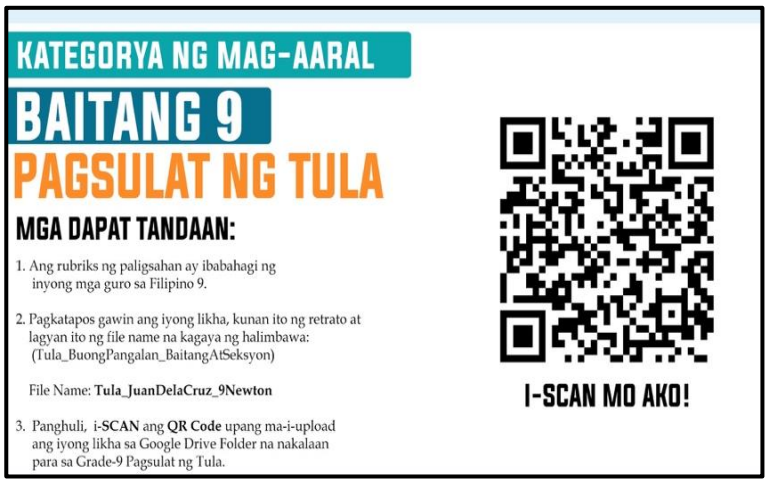

Figure 24. School D Digitized Submission of Contest Entries

Connected to this practice is the school's use of online communication platforms to disseminate announcements and share milestones. The photo artifact below showcases School D's use of their official social media page to announce their school's achievement in a regional competition.



Figure 25. School D's Announcements in Their Social Media Page

All the above evidence highlights the fact that ICT integration in School D also manifests in other areas of their processes aside from instructions provisions. Moreover, these integration practices have optimized their institutional processes. The presence of ICT in schools facilitates the digitization which then improves educational services (Timotheou, 2023).

Additional evidence of administrative support is observed through their actions for teachers' capacity-building. The observation image that follows shows a department head providing technical support.



Figure 26. School D Department Head Giving Technical Assistance

Relative to this is the document evidence *"Oplan CARE (Collaboration and Assistance Reaching Everyone's Needs) included conduct of weekly meetings, lecture and fellowship, LAC sessions, and provision of technical assistance."* This effort demonstrates how governance is operationalized with consistent, organized expert assistance which follows the description that providing technical assistance is among the key functions of school leaders (Pareja, 2025).

Recurring best practices

Table 2. Consolidated Results of Observation Checklist

ICT INFRASTRUCTURE MANAGEMENT	School A	School B	School C	School D	f	%
Stable internet connection is available in classrooms and offices.	/	/	/	/	4	100
Classrooms are equipped with projectors, smart TVs, or digital boards.	/	/	/	/	4	100
Computer laboratory is functional and accessible with 1:1 ratio.	/	/	/	/	4	100
Teachers have access to laptops, tablets, or other devices.	/	/	/	/	4	100
Students have access to digital tools.	/	/	/	/	4	100
Printers, scanners, and other support hardware are available.	/	/	/	/	4	100
Technical support personnel are present or available.	/	/	/	/	4	100
Devices are regularly maintained.	/	/	O	/	3	75
ICT inventory or monitoring log is visible.	O	/	/	/	3	75
There is adequate power supply or backup solutions.	/	/	/	/	4	100
LEADERSHIP AND GOVERNANCE	**School A**	**School B**	**School C**	**School D**	**f**	**%**
Digital practices follow school and DepEd ICT policies.	/	/	/	/	4	100
ICT action plan is posted or accessible.	O	/	O	/	2	50
ICT goals are integrated into the SIP or AIP.	/	/	/	/	4	100
School head promotes digital practices during meetings or events.	/	/	/	/	4	100
ICT coordinator or ICT team is formally designated.	/	/	/	/	4	100
ICT policies on safety, data privacy, or acceptable use are posted.	/	O	O	/	2	50
School administration uses digital platforms for communication.	/	/	/	/	4	100
Decision-making is guided by digital data and school records.	/	/	/	/	4	100
School leadership supports digital transformation through planning and resource provision.	/	/	/	/	4	100
Evidence of leadership support for ICT initiatives is visible.	/	/	/	/	4	100
TEACHING AND LEARNING PRACTICES	**School A**	**School B**	**School C**	**School D**	**f**	**%**
Teachers use digital tools during lessons (e.g., presentations, apps)	/	/	/	/	4	100
Students engage in activities using devices or online platforms	/	/	/	/	4	100
Use of LMS or learning platforms (e.g., Google Classroom, DepEd Commons) is observed.	/	/	O	/	3	75
Teachers use multimedia resources (e.g., videos, animations)	/	/	/	/	4	100
Students create digital outputs (e.g., e-posters, blogs, videos)	/	/	/	/	4	100
Lesson plans or learning modules incorporated use of technology.	/	/	/	/	4	100
Learning activities encourage student collaboration via digital tools.	/	/	/	/	4	100
Teachers employ the use of digital assessments.	/	/	/	/	4	100
Class uses gamified learning platforms (e.g., Kahoot, WayGround)	/	/	/	/	4	100
Teachers provide digital feedback or comments on student work.	/	/	/	/	4	100
PROFESSIONAL DEVELOPMENT	**School A**	**School B**	**School C**	**School D**	**f**	**%**
School regularly conducts ICT-related INSETs or LAC sessions.	/	/	/	/	4	100
School participates in district/division/regional/national level trainings in ICT.	/	/	/	/	4	100
Certificates of ICT training are displayed or available for viewing.	/	/	/	/	4	100
Technical assistance is for capacity improvements is observed.	/	/	/	/	4	100
Peer mentoring is visible or documented.	/	/	/	/	4	100
Records of participation in webinars are available.	/	/	/	/	4	100
Professional development plan includes digital competency goals.	/	O	/	/	3	75
Tech-savvy teachers lead ICT resource sharing initiatives.	/	/	/	/	4	100
There is evidence of cross-training for non-teaching staff.	O	O	/	/	2	50
Feedback mechanisms are conducted after ICT PD.	/	/	/	/	4	100
DIGITAL CULTURE AND SUSTAINABILITY	**School A**	**School B**	**School C**	**School D**	**F**	**%**
Digital citizenship and responsible technology use are promoted within the school.	/	/	/	/	4	100

Digital platforms are used for communication with teachers, students, and parents.	/	/	/	/	4	100
School processes, such as grading, attendance, or forms, are digitized.	/	/	/	/	4	100
Privacy, cybersecurity, or copyright guidelines are visibly posted.	O	O	O	/	1	25
ICT-related activities or campaigns are regularly conducted in the school.	/	/	/	/	4	100
The school maintains an active website or official social media page.	/	/	/	/	4	100
Digital initiatives or ICT programs are sustained across school years.	/	/	/	/	4	100
ICT partnerships or external support from community stakeholders are documented.	/	/	/	/	4	100
The school has received ICT-related recognition or awards at the district, division, regional, national, or international level.	/	/	/	/	4	100
Digital achievements or innovation practices are shared within the school community.	/	/	/	/	4	100

Legend: / – Observed O – Not Ob-

ICT Infrastructure Management

Based on the observation, it was determined that ICT infrastructure and management was one of the strongest pillars of digital transformation at the four schools classified as digitally transformed. Devices can cater 1:1 for the learners. All the schools also have good internet connectivity in their buildings which aid the utility of multimedia tools such as smart TV or projectors in every classroom. In terms of accessibility, all schools showed open accessibility to their devices and computer laboratories. Technicians were also present to fix operational issues as soon as possible or in cases that disruptions to digital learning occur. However, although the performance in this area was already commendable, Practices related to maintenance, ICT inventory monitoring still require further improvement. This suggests that while the utility of infrastructure is already efficient, schools can still benefit from enhanced long-term sustainability approaches by strengthening their physical infrastructure management.

What distinguished these schools was not merely the availability of technology, but the presence of effective systems for managing the utilization of their facilities. In particular, one unique practice of these schools is on network and access management which encompasses MAC address filtering and remote monitoring of client desktops. One participant shared,

> "*What we did is we utilized the feature of the devices which has MAC Address Filtering. So in that sense, only the devices that are allowed using the MAC… they are the only ones who can connect.*"
>
> (*What we did is we utilized yung feature nga ng mga devices which has yung MAC Address Filtering. So in that sense, only the devices that are allowed using the MAC… they are the only ones who can connect.*)

Overall, the results show that schools that have undergone digital transformation place a high priority on infrastructure as a strategic investment. As said by Sepulveda (2020), successful digital transformation requires having sound infrastructure which allows institutions to be able to adapt continually.

Leadership and Governance

As per the observation, the school heads lead the initiative for the ICT – related programs. This can be seen in their advocacy efforts on their special program on ICT and response in entertaining ICT – related requests. School leaders across cases also ensure that ICT is legally built into school planning as reflected in their documents. All schools also have assigned ICT coordinators tasked with managing their computer laboratories and equipment. On the other hand, few indicators received low ratings, particularly those concerning the visibility of ICT policies and the accessibility of their

action plans. This means that while implementation procedures are in place, visibility of these policies could still be improved.

One of the most notable practices observed in these schools were the administrations' initiative on digitizing their school processes as reflected in their school documents.

ADMINISTRATIVE EFFICIENCY	1.Automate Processes	-Implement digital tools for record -keeping, reporting and communication.
	2.Centralized Database	-Integrate student, teacher and school data
	3.Electronic Document Management	--Digitize files and documents

Plate 1. Extract on digitization of School Processes

These findings point out the importance of leadership in the overall process of ICT implementation. All of this supports the words of Mafe (2023) who argued that leadership heavily influenced innovation and the maintenance of educational change.

Teaching and Learning Practices

Shifts in teaching and learning practices were the clearest indicators of digital transformation in the four cases. As observed, teachers regularly integrate digital tools in classroom instructions as reflected in their lesson plans. Likewise, students also actively engage to develop their digital skills. Consequently, an inconsistency in the usage of learning management systems were observed from the cases. This suggests that even though many LMS are already available for use such as the DepEd Commons or Google Classroom, not all schools have maximized their use.

Two unique best practices were observed under this domain. First is the use of collaborative ICT – assisted learning. As already provided in the per case presentation, teachers from Schools A, B, C, and D often use collaborative tools and gamified learning apps like Kahoot and WayGround. Second, there is also their unique focus on experiential learning where learners are often guided to produce innovations and project based – outputs. This was made evident in their hands-on experiences in coding, programming, systems developments, robotics and use of other complex applications.

These findings suggest that the integration of ICT in instructions delivery by these digitally transformed schools has optimized their overall curricular experiences. These results align with the ISTE Standards for Educators (2021), which highlight that successful technology incorporation empowers students, improves teamwork as well as encourages innovation.

Professional Development

Observation data support that teachers across cases actively participated in formal or informal ICT – related professional learning opportunities. However, despite strong performance in this domain, the indicator about professional development plans showed instability. This suggests that while professional learning activities are regularly done, schools still need to secure structured digital competency development planning.

In terms of best practice, what stood out among these schools was their mentoring mechanisms. These could be in form of technical assistance, peer mentoring, or resource and strategy sharing. Below is a school document that reflects these practices.

Assist Teachers and Students in Managing Their DepEd Email Accounts	1. Provide technical assistance in password reset, account recovery, and activation of DepEd email accounts 2. Coordinate with Division ICT Unit for escalated account issues

Plate 2. Extract on Mentoring Mechanism

Nonetheless, the findings indicate that digitally transformed schools have strong professional development practices that support the continuous improvement of teachers on technology use. These findings follow what Rahmawati and Al-Rashid (2025) said that sustained capacity building has a major impact in successful instructional innovation.

Digital Culture and Sustainability

Observation on the four schools' digital culture and sustainability revealed that ICT is deeply integrated into their culture. This claim manifest in the schools' receipt of ICT awards; digitization of workflow; reminders on responsible technology use; and usage of digital communication channels. However, despite having a firmly established digital culture, it was noticed in these four schools that cyber security and copyright guidelines were collectively absent from view. This imply that although a digital culture that leverages the usage of ICT is already in place, a greater focus on digital ethics could better improve the sustainability of the schools' ICT programs.

As for the innovative practice, the institutionalization of digital communication systems was a unique practice of these schools. A document extract detailing the utilization of an official communication channel serves as proof to this.

BONGGA Teleradyo Eskwela	Utilized Bongga Teleradyo communication platform to support FLO strategies in addressing learning diversity.	Utilization of Bongga Teleradyo communication platform/FB page to support FLO strategies in addressing learning diversity and information dissemination

Plate 3. Extract on an Institutionalized Communication Channel

The regularity with which announcements regarding school events and accomplishments were uploaded on their digital platforms led to a better communication with the community. Overall, the findings demonstrate that the four digitally transformed schools have successfully ingrained digital practices into their entire school operations. These findings support the argument of Bozkus (2023) that digital transformation is not only about technological adoption but also about the development of organizational cultures.

Synthesis of Findings

The four digitally transformed schools epitomize highly functioning and innovative learning institutions. Their transformation is evident not only in infrastructure availability but also in leadership commitment, technology-enhanced pedagogy, collaborative professional development, and the cultivation of a sustainable digital culture. As posited by Ruiz-Mallen and Hears (2020), program sustainability is a culmination of efforts in varied areas of operation. To which, these schools have achieved as evident in their optimized integration of digital practices into their day – to- day institutional systems. These innovative ICT practices identified were: (1) network and access management, (2) digitization of school processes, (3) collaborative and gamified ICT – assisted learning, (4) project – based experiential learning, (5) mentoring mechanisms, and (6) school communication channels.

At the same time, the findings also point to areas that still require improvement, particularly with regards to formal planning and documentation and the visibility of policies on digital ethics and security. By addressing these concerns, schools could better sustain their technology – driven learning environment.

Conclusions

The study revealed that digitally transformed public secondary schools demonstrate a combination of strategic technology integration, innovative instructional practices, and organizational support systems that promote meaningful digital transformation. The best

practices identified indicate that digital transformation extends beyond the availability of digital tools and infrastructure; rather, it involves the purposeful use of technology to enhance teaching and learning, improve school operations, strengthen collaboration, and support stakeholders' digital competencies.

Across the cases, schools at the Optimized level exhibited practices characterized by intentional technology adoption, continuous capacity-building among teachers, learner-centered digital learning approaches, and collaborative efforts among school leaders, teachers, students, parents, and external partners. These findings suggest that successful digital transformation is a sustained organizational process driven by shared vision, adaptive leadership, and a culture of innovation.

Recommendations

Based on the conclusions, the study recommends that the school administrators may strengthen digital transformation initiatives by developing a clear digital transformation roadmap aligned with school goals, continuously monitoring technology integration practices, and establishing mechanisms for sharing successful ICT practices among teachers and schools. Teachers may also be encouraged to move beyond technology use for instructional support and explore more transformative digital practices, such as collaborative learning environments, digital content creation, authentic assessments, and technology-supported differentiated instruction. The Schools Division Office may also consider documenting and disseminating best practices from digitally transformed schools to serve as benchmarks for other schools. Professional learning communities and mentoring programs may also be established to support schools progressing toward higher levels of digital maturity. Furthermore, to bridge the observational gaps identified regarding digital ethics, copyright, and security, school administrators and policymakers are strongly recommended to integrate robust cybersecurity training, data privacy protocols, and digital citizenship frameworks alongside future infrastructure upgrades. Ensuring that faculty and students are well-versed in data protection and ethical digital practices will safeguard institutional continuity and secure long-term sustainability for public secondary school digital transformations.

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