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Research Paper

Technology integration in pedagogical practices and school management: implementation, challenges, and coping mechanisms toward an improvement plan

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ABSTRACT

Technology integration plays a vital role in both teaching-learning processes and school management. However, its implementation in public secondary schools remains uneven, particularly in rural and resource-limited areas. This study examined the extent of technology integration in pedagogical practices and school management among selected public secondary schools in Oriental Mindoro. It also identified the challenges encountered and coping strategies employed as a basis for an Enhanced School Improvement Plan. The study utilized an explanatory sequential mixed-method research design involving 145 school administrators and 145 teachers from mega and large public secondary schools. Data were collected using a survey questionnaire with high reliability coefficients (Cronbach's alpha = 0.956 and 0.951). Quantitative data were analyzed using weighted mean, one-way ANOVA, and Tukey's post hoc test, while qualitative responses were examined through thematic analysis. Findings revealed a high level of technology integration in instructional delivery and communication, while moderate levels were observed in digital content creation and organizational tasks. In school management, technology use was extensive in class operations, staff management, and data/resource management, but less evident in predictive planning, data ethics, and system integration. Significant differences were found among pedagogical and management domains ($p < 0.05$). Major challenges included limited skills, inadequate infrastructure, time constraints, and systemic issues. Coping strategies involved professional development, streamlined workflows, institutional support, and infrastructure enhancement. The study highlights the need for advanced digital skills training and content digitization to strengthen effective technology integration.

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1. INTRODUCTION

Twenty-first century learning has a way to go and technology has become a crucial piece of that puzzle as it can drastically enhance administrative and instructional processes. Digital resources are being used by schools worldwide to enhance learning, increase student involvement, and simplify administrative duties [1]. The use of information and communication technology (ICT) in education creates opportunities for personalized learning experiences, data-driven decision making and timely feedback [2]. In this digital age not only are the working methods in the classroom changing but the roles of teacher and administrator in technology-enriched learning environments are evolving as well [3]. The experiences of countries like the United States, Finland and South Korea illustrate the value of investing in the appropriate technology to support learning that aligns with the curriculum, such as learner management systems (LMS) and teacher learning, to enhance instruction and increase administrative efficiency.

Technology impacts on school learning has shifted from being helpful to being essential as a way to create a learning environment that is dynamic and inclusive [4]. This change has had an impact on teaching methods and added new opportunities to learn which meet the needs of students with varying abilities. The use of interactive simulations, multimedia and virtual tools increases participation and improves understanding, and thus retention [5]. Technology also can facilitate personalized learning, which embraces child differences in learning style, pace and preference; therefore, it also promotes accessibility and equity in education.

Furthermore, technological integration equips the learnings for the requirements of future workforce of a digitally driven era by developing the key digital literacy skills [6]. It helps teachers differentiate instruction and close achievement gaps, thereby providing equal opportunity for success for all students regardless of their background [7]. Technology breaks down the geographical barriers to access to world knowledge and learning opportunities [8], [9].

Adaptive learning platforms, a technique from the realm of advanced tools, apply data and AI-driven reasoning to provide individualized learning experiences and feedback that boost academic performance with one-on-one support [10]. Further, the use of immersive technologies such as Virtual Reality, Augmented Reality, simulations and learning games allow for experiential learning, which enhances learner's motivation and their conceptual understanding in an engaging and safe environment [11].

The Department of Education (DepEd) recognizes the importance of technology in improving educational quality in the Philippines. DepEd is working hard on some of the key projects like the DepEd Computerization Program (DCP), the implementation of the LMS, and the Matatag Curriculum. These are aligned with the Philippine Development Plan (PDP) 2023-2028 with its thrust of digitalization to improve infrastructure, digital literacy and access to technology-driven services in education.

Technology integration in public secondary schools, especially in resource-challenged and rural areas is still not adequate despite national efforts. Rural and urban schools may encounter certain obstacles, including limited devices, poor internet access, and inadequate teacher training. Rural and urban schools can have various challenges, such as the lack of devices, weak internet access, and insufficient teacher training. Geographic isolation and different levels of ICT skills among residents make effective integration difficult elsewhere, such as in Oriental Mindoro.

The researcher, as a School ICT Coordinator, felt that with the importance of technology in the educational field, there was noticeable lack of implementation of this important tool in the school at a national level which prompted him to carry out this study so as to determine the level of technology integration that the school has in pedagogical practices and school administration. The results were used to build an Enhanced Improvement Plan, customized for each province's unique needs and constraints of the schools.

2. RELATED WORK

The subject of the integration of technology in the educational field has been one that yielded more and more scholarly attention. Collins and Halverson [3] suggest that the digital revolution shifts the role of the educator and administrator, thus requiring new skills and institutional arrangements in the process. Likewise, UNESCO [1] and OECD [2] have outlined the worldwide trend towards the use of ICT for learning and the development of digital literacy among teachers as a prerequisite for technology to be used in the classroom effectively.

In the Philippines, the work of Tomato [12] explores the use of ICT in the national education system and notes that this is not yet able to be implemented in the classroom as required. Limited infrastructure, budget constraints, and insufficient training were identified by Torres and Cruz [13] as the major obstacles to technology adoption in public schools, with Garcia and Lopez [14] providing an extensive background analysis of ICT challenges faced in rural areas. The DepEd Order No. 42, s. National ICT literacy policies have been adopted for teachers in 2017 [15] and there is a persisting lack of teachers with adequate training in ICTs skills, according to the report by Santos and Ramirez [16].

Research in other less developed settings confirms these worries. Nevertheless, teachers' fear of being left behind technologically was cited as a blockage to the integration of ICTs in schools in Ghana by [17]. [18] Showed that teachers' perceptions of technology are significantly related to their digital confidence, with the quality of their trainings and institutional support the greatest influence. The results follow the ones provided by [19] who stated “Continuous professional learning" is a major ingredient in the process of seamless inclusion of sustainable technologies.

On school management, [20] emphasized the benefits of digital systems in simplifying administrative communication, the data management process, and the grading. [21] Emphasized the need for ethical standards and leadership development as well as the potential impact of technology on educational administration. [22] Took a systematic review of the published literature on technology integration in K–12 schools in the Philippines finding that there are still gaps in technology infrastructure and pedagogical alignment as the common challenges of digital transformation in public schools.

The current study contributes to this existing literature because it focuses on technology integration policies and practices from both pedagogical and school management perspectives in a particular province, as well as sets priorities for coping mechanisms and provides a context for developing a viable improvement plan.

3. METHODOLOGY

A descriptive study, using a mixed Methods (explanatory sequential) research design, with attention to the collection and analysis of quantitative data, was used in this study. The approach was qualitative in the process of explaining the findings of the quantitative data. Measurement and analysis of the quantitative data were used to determine the extent of teachers using technologies in instructional communication, which include using technology in teaching, instructional organization, information, and communication, and instructional creation, and in school management, including classroom management, data management, personnel management, and management of school resources. This was followed up with a qualitative phase of the research, with focus group discussions (FGDs) held to gain an understanding on the challenges faced and coping mechanisms of technology integration.

A total of 290 respondents comprised of 145 school administrators (principals and head teachers) and 145 teachers (Junior High School and Senior High School) from public schools in different public schools in the Division of Oriental Mindoro. The teacher-participants consisted of regular permanent secondary school teachers and were a convenience sample from the mega and large schools that had implementing units for each of the districts. The sample of school administrators was derived by taking a non-randsam sample, determined by minimum of one year in position as principal or head teacher.

Stratified sampling was used to sample the research locale as a whole. G*Power was used, with an effect size of 0.25, with an alpha of 0.05 and with a power of 0.90, a sample size of 290 was computed.

Simple random non-proportional sampling was applied per district to ensure that respondents met the specified inclusion criteria.

A self-made four-part survey questionnaire was used to collect data: (1) the extent of teachers' technology integration in pedagogical practices in terms of instruction, organization, communication, and creation, (2) the extent of technology integration in school management, focusing on classroom management, data management, personnel management, and resource management, (3) challenges encountered in technology integration, and (4) coping mechanisms adopted to address these challenges. The instrument was validated by four local experts specializing in technology integration. Responses for Parts 1 and 2 were rated on a 5-point Likert scale, as described in Table 1, while Parts 3 and 4 were explored through FGDs.

Table 1. Numerical Value, Statistical Limits, and Verbal Description

Numerical Value	Statistical Limits	Verbal Description
5	4.50–5.00	Very High Extent (VHE)
4	3.50–4.49	High Extent (HE)
3	2.50–3.49	Moderate Extent (ME)
2	1.50–2.49	Low Extent (LE)
1	1.00–1.49	Very Low Extent (VLE)

The reliability of the research instrument was established through a pilot test with 30 non-respondent school heads, head teachers, and teachers, using Cronbach's Alpha to assess internal consistency at a 95% level of significance. Results are presented in Table 2.

Table 2. Reliability Results of the Instrument

Variables	Items	Cronbach Alpha	Description
Technology Integration in Pedagogical Practices	40	.956	Very Reliable
Technology Integration in School Management	40	.951	Very Reliable

Data were collected by sending formal request letters to the school division office and respective principals. In case of approval, the participants were directed to the groups and explained the study. The questionnaire was distributed both in printed and digital format followed by FGDs the next day.

The results of the quantitative data were processed by comparing level of technology integration, and by comparing group differences in which one-way ANOVA was performed and Tukey's post hoc test used to find significant differences among groups. Thematic analysis according to [23] was used for the analyses of qualitative FGD data.

4. RESULTS AND DISCUSSION

The findings from this study are presented via quantitative and qualitative methods outlined in each of the main variables of the study: Technology Integration in Pedagogical Practices, Technology Integration in School Management, Differences across Domains, Challenges, and Coping Mechanisms.

4.1 Technology Integration in Pedagogical Practices

4.1.1 Instruction

The composite mean of respondents' head's (teacher's) rating on the extent of technology integration in their instruction was at a High Extent (HE) level with a mean score of 3.74. The most frequently rated was using the multimedia tools on a regular basis (M = 4.30). Four items, however, were rated with Moderate Extent: use of gamified platforms (M = 3.43), Data Analytics Tools (M = 3.43), Create instructional materials in digital format (M = 3.16), Conduct online assessment (M = 3.10). Teacher self-assessments yielded a similar composite mean of 3.63 (HE), with use of technological devices rated highest (M = 4.24), while gamified platforms (M = 3.24), data analytics tools (M = 3.17), digital material creation (M = 3.06), and online assessments (M = 2.86) were rated at Moderate Extent. The overall combined mean was

3.68 (HE), with multimedia tool use ranking first (M = 4.26) and conduct of online assessments ranking last (M = 2.98). These findings are consistent with [24], who emphasize the need for targeted investments in teacher training and resources to support innovative, student-centered learning experiences.

4.1.2 Organization

The composite mean for organizational practices was 3.49 (Moderate Extent) from school heads and 3.48 (ME) from teachers, yielding an overall mean of 3.49 (ME). Digital attendance systems (M = 4.17) was rated as the top item, whereas the use of online platforms to coordinate and share teaching resources with students was the lowest (M = 2.86). The results suggest that teachers are effective in integrating technology for elementary organizational purposes, but collaborative and student-centered practices are still not effectively integrated. Digital systems can support instructional process and administrative efficiency if professionalized in an appropriate manner as pointed out by Johnson and Matthews [24].

4.1.3 Communication

Teachers' abilities in technological applications in pedagogical communication were rated as High Extent (HE) by the school head with a composite mean score of 3.78 and 3.73 by teachers themselves. The overall mean value was 3.76 (HE) and the highest value was for creation of PowerPoint presentations (M = 4.38). Slower scores are associated with establishing parent-friendly communication channels in their school (M = 3.52), facilitating meetings via digital channels (M = 3.51), and creating class or school websites (M = 2.89). These findings indicate that more community engagement, via digital means, is not a strong component of the movement, beyond foundational communication technology. This is in line with [25] who believe that enlarging the digital skill competency enhances the rapport between home and school.

4.1.4 Creation

The overall mean score rated for technology integration of creation was a Moderate Extent (ME) for both the school head (composite mean score = 3.12) and the teachers (composite mean score = 3.13). The most highly rated practice was differentiated learning materials (M = 3.78), and the lowest was virtual classrooms/discussion boards (M = 2.73) and digital storytelling platforms (M = 2.60). These findings suggest that the use of technology in creative practices is still at a nascent level. Caberoy-Almenara: The confidence and capability in teaching staff to embrace creative digital strategies to augment teaching and learning greatly enhances engagement and effectiveness [26].

4.2 Technology Integration in School Management

4.2.1 Classroom Management

There was notable consensus between the schools' heads and teachers on the integration of classroom management with a composite mean of 4.25 (High Extent) for the schools pupils' heads and a composite mean of 4.18 (High Extent) for the teachers pupils' rating, giving an overall mean of 4.21 (High Extent). Use of technology to manage grading, lesson preparation and tracking student progress was the highest rated item (M = 4.60) and the lowest was use of technology with adaptive technologies for personalized learning (M = 3.84). The results clearly show that the use of technology is becoming a part of everyday classroom activities. With proper training and resources, teachers can integrate technology to create inclusive, responsive, and data-informed classrooms as suggested by [21].

4.2.2 Data Management

School heads and teachers overall rated technology integration in data management as a High Extent (HE) (the composite mean of the two is 4.01; HE). Most of the items were rated at M > 4, with the rating for using data management tools to simplify report generation (M = 4.30) deemed the highest. Data privacy (M = 3.88), Backup and Recovery Systems (M = 3.87), Infrastructure Support (M = 3.84) and Inter-departmental System Integration (M = 3.82) received relatively low ratings. This gap is similar to the gaps identified by [20] which pointed out difficulties with infrastructure and training in accessing school data.

4.2.3 Personnel Management

When integrating personnel management in school, the mean score for the school head was rated 4.06 (HE) and the teachers rated 4.02 (HE) for a grand mean of 4.04 (HE). Leveraging technology to support staff learning and development was the top rated item (M = 4.29), with highest fair and transparent staff assessments of using technology being rated last (M = 3.61). The findings confirm those of [21] which spoke about the need of ethical principles and leadership development in effectively using technology to aid personnel management.

4.2.4 Resource Management

The school heads rated Resource management 3.70 (HE) while the teachers rated it 3.62 (HE) the two mean 3.66 (HE). Digital tools to plan finances and budgets were the best rated (M = 3.93), but the lowest rates were given to forecasting future resource needs (M = 3.47) and system integration across various platforms (M = 3.53). This discovery is concordant to, who emphasizes the value of integrated digital systems to more complete system planning in the education sector.

4.3 Differences in Technology Integration in Pedagogical Practices

In order to identify the differences in the extent of teachers' technology integration in pedagogical practices, variance analysis (ANOVA) was carried out which resulted in an F value of 29.4416 and a p value of 1.1102e-15 < 0.05 Table 3. This means that the null hypothesis for having no significant difference at the four pedagogical levels is rejected and it is concluded that there is significant difference in the extent of the technology integration at the four pedagogical levels.

Table 3. Analysis of Variance (ANOVA) Results for the Difference in the Extent of Teachers' Technology Integration in Pedagogical Practices

Source of Variation	SS	Df	MS	F-Value	P-Value	Result
Between Groups	47.1481	3	15.716	29.4416	$1.1102e^{-15}$	Significant
Within Groups	617.078	1156	0.5338			
Total	664.2261	1159	0.5731			

Table 4 indicates that the Tukey nonparametric post hoc test revealed for each other paired comparisons were significant for most comparisons within the domains. However, the greatest difference was between instruction and creation (mean diff. = 0.5545, Q = 12.92, p < 0.0001) suggesting that teachers use technologies much more extensively in their instructional practices than in creative, student-centered activities. The creation domain also differed significantly from both organization (mean diff. = 0.3548, Q = 8.27, p < 0.0001) and communication (mean diff. = 0.3834, Q = 8.94, p < 0.0001). A difference in organizational and communication skills was not noted (mean difference = 0.0286; Q = 0.67; p = 0.9653), however, as they occur in a functional overlap of the domains on digital platforms. The results corroborate [19] and [24] that in higher order, student directed tasks, and the technology is not used if it does not receive professional development.

Table 4. Tukey Post Hoc Analysis on Differences in the Extent of Teachers' Technology Integration in Pedagogical Practices

Variables		Mean Diff.	Q-Value	p-Value	Significance
Instruction	Organization	0.1997	4.65	0.0057	Significant
	Communication	0.1710	3.99	0.0252	Significant
	Creation	0.5545	12.92	0.0001	Highly Significant
Organization	Communication	0.0286	0.67	0.9653	Not Significant
	Creation	0.3548	8.27	0.0001	Highly Significant
Communication	Creation	0.3834	8.94	0.0001	Highly Significant

4.4 Differences in Technology Integration in School Management

The ANOVA computed an F-value of 33.3285 (p = 1.1102e-16 < 0.05) and shows that technology integration, significantly varies between the four school management domains, as displayed in Table 5. The null hypothesis is not accepted.

Table 5. Analysis of Variance (ANOVA) Results for the Difference in the Extent of Technology Integration in School Management

Source Of Variation	SS	Df	MS	F	P-Value	Result
Between Groups	68.4775	3	22.8258	33.3285	$1.1102e^{-16}$	Significant
Within Groups	791.7146	1156	0.6849			
Total	860.1921	1159	0.7422			

According to the Tukey post hoc comparison tests shown in Table 6 the different disciplinary areas that showed the highest difference from the other differences were between personnel management and management of resources, with a mean difference of 0.6259 (Q = 12.88, p < 0.0001), and between classroom management and management of resources with a mean difference of 0.5559 (Q = 11.44, p < 0.0001). Another significant difference was for data management vs. management of resources (mean diff. = 0.3586, Q = 7.38, p < 0.0001), and between data management vs. personnel management (mean diff. = 0.2672, Q = 5.50, p < 0.001). There was no significant difference between the two (classroom management and personnel management) (mean diff. = 0.07, Q = 1.44, p = 0.7386). The findings invariably show a lower level of education around the use of resources, which begs the question of whether there is sufficient investment in digital capability to support management of resources.

Table 6. Tukey Post Hoc Analysis on Differences in the Extent of Technology Integration in School Management

Variables		Mean Diff.	Q-Value	P-Value	Significance
Classroom Management	Data Management	0.1972	4.06	0.0217	Significant
	Personnel Management	0.07	1.44	0.7386	Not Significant
	Management of Resources	0.5559	11.44	< 0.0001	Significant
Data Management	Personnel Management	0.2672	5.50	< 0.001	Significant
	Management of Resources	0.3586	7.38	< 0.0001	Significant
Personnel Management	Management of Resources	0.6259	12.88	< 0.0001	Significant

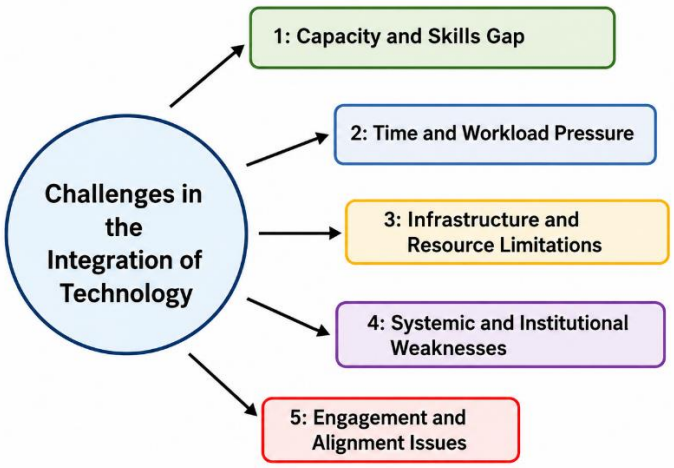

Figure 1. Thematic Diagram of the Challenges in the Integration of Technology

As shown in Figure 1, these interconnected challenges affect the effective implementation and sustainability of technology integration in schools. Addressing these issues is essential to improve teaching practices, school management, and overall educational outcomes.

4.5 Challenges in Technology Integration

4.5.1 Capacity and Skills Gap

A clearly visible shortage in the digital skills of teachers and the school administration is one of the most important factors that undermines the integration of technology in effective ways, as they are less proficient in some areas like data analytics, digital content creation and gamification. Our findings are consistent with those of [18] who emphasize that one of the bases of successful application of ICTs is digital literacy. This challenge needs to be met through continuous professional development that is (contextualized and) practically oriented and is relevant to the level of curriculum standards.

4.5.2 Time and Workload Pressure

Fully integrating technology requires considerable time to plan, create content, and to reflect and improve. Normally, teachers have already a full and multiple teaching load and consider it challenging to take time for them. However, as noted by Collins and Halverson [3] rigid institutional structures and inadequate allowable time for teachers to think creatively about how to design instruction can often make it difficult to innovate in education. Schools need to dedicate a protected time to Instruction Design & Tech related PD.

4.5.3 Infrastructure and Resource Limitations

Infrastructure issues such as unreliable internet, fewer devices available to use and availability of limited funds are major challenges faced in larger integration of technology. The situation reflects the findings of Collins and Halverson [3] in that the PISA results are not necessarily what policy makers are expecting, as also reflected in policy challenges identified by the UNESCO [1] and DepEd Order No. 42, s. Most of these refer to lack of equality in ICT provision as an impediment to inclusive education through digital technology [15]. Nevertheless, if teachers are willing to incorporate technology to improve the learning environment, it is often difficult to do due to lack of supporting infrastructure.

4.5.4 Systemic and Institutional Weaknesses

The absence of clear guidance and structures was cited as one of the main factors for unreliability in teachers' use of digital tools. A DepEd Order edited by DepEd Order No. 42, s. 2017 [15] calls upon curriculum policies that are grounded in an understanding of ICT, but many schools have significant difficulties in enacting these policies, due to a lack of operationalization. Harrell and Bynum argue that institutionalization and leadership are key for making technology part of the culture in the school. In the absence of a whole-school system of support, change cannot be thought to trickle down from the device of individual teachers.

4.5.5 Engagement and Alignment Issues

One difficulty that remains is to make sure that digital tools have significance in learning and align to the curriculum. Consistent challenges are consistently reported by teachers in preparing lessons that provide meaningful opportunities to incorporate the use of technology to support learning that is not distracting to students and does not crowd out learning. In order to design successful integration, it is important that not only is the person using technology technically competent, but also pedagogically intentional, is able to provide teachers with continuing support, and is able to meet learner needs with design strategies.

4.6 Coping Mechanisms

4.6.1 Professional Development and Capacity Building

Throughout faculty meetings and other professional development sessions, school leaders establish priority. School leaders give priority to training, and guide teachers to make use of platforms like

Google Classroom and Canva. Institutional-based training is supplemented with various instances of self-directed learning in form of webinars, on-line courses, YouTube, etc. It is consistent to who concluded that, the good quality training and improvement of digital literacy have positive effect on teacher confidence and proficiency in integration of digital technology into learning.

4.6.2 Time and Workflow Optimization

Teachers and heads of school intentionally incorporate intentional time management strategies such as allowing buffer time within lesson plans when preparing for lessons involving technology problems, and identifying optimal lesson preparation practices. These strategies echo the conclusions from [22] that schools need to be more adaptive and able to deal with the conflicting strains of scarce resources and variable digital environments.

4.6.3 Infrastructure and Accessibility Enhancement

Teachers grow these technology gaps using a blended/modular model that incorporates online and offline learning tools such as online resources, handouts, and paper reading tools for students without access to digital formats. Such practices help to diminish educational inequalities and maintain education inclusive. Conducted research about the same issue that confirms the importance of modular and blended learning models as a solution to technological inequality.

4.6.4 Institutional and Administrative Support

School leaders took a leadership in starting system level approaches for the institutionalization of the technology, while teachers attended the Learning Action Cell (LAC) sessions and conducted peer mentoring. This collaborative capacity building is compatible with the current professional development framework in DepEd with a high level of trust in unfamiliar tools.

4.6.5 Curriculum and Pedagogical Alignment

Curriculum aligned approaches like designing digital curriculum based on Most Essential Learning Competencies (MELCs), creating an evaluation rubric for both subject learning and digital competencies, and applying blended learning learning models were identified by teachers and school leaders. Have found that structured digital engagement clearly has a positive impact on student focus and learning results.

4.6.6 Engagement and Motivation Strategies

Students were oriented before new technologies were used in the classroom, while additionally students made use of interactive components in the digital learning setting, such as quizzes, polls, and gamified activities, that makes digital learning environments more approachable. Pupil feedback was provided and strategies were adjusted as needed through the use of feedback mechanisms. Education activities were designed that would provide interactive learning, adaptable options, and provided structure to support teaching and learning in a manner that would enhance equity opportunities.

4.7 Enhanced School Improvement Plan

As a result of the findings, an Enhanced School Improvement Plan (SIP) was provided that was designed to help fill gaps identified in technology integration. The plan addresses the pedagogical activities' moderately-developed areas, given pedagogical focus on organization and creation, as well as underdeveloped areas of school management in resource management, and also strategic planning. The strategic approaches are the improvement of teaching based on data, development of digital teaching resources, introduction of gamification teaching, creation of online learning platforms, students' learning resource building, implementation of real action problem-based learning (PBL), collaborative utilization of digital teaching aid, collaborative utilization of teaching videos, and advance planning for teaching resources. There is a full and organized structure for each activity by specifying timeline, required resources and responsible persons, thus presenting a comprehensive overview for ICT in revolutionizing teaching and in the integrated use of ICT in managing schools at all levels.

5. CONCLUSION

This study finds teachers were using technology in the public secondary schools in different levels throughout the pedagogical domains with high level of use in instruction, communication, classroom management, and moderate level of use in organization, creation. The technology integration level in school administration varies widely between schools, with higher integration across other management areas. The ANOVA results showed that there were statistically significant differences between each of the domains with p-values at < 0.05, the creation domain and the resource management domain across the counterpart consistently developed the lowest level of integration.

Inadequacies in skill and time/ workload, infrastructure, institutional support and strategic alignment all make integrating more difficult. In response to these challenges, teachers and school administrators use a variety of strategies to professional development, optimize workflow, improve infrastructure, implement institutional support systems, align the curriculum and implement student engagement strategies. In response to the identified gaps an Enhanced School Improvement Plan (SIP) was put forward, emphasizing the need for ongoing capacity building, for technology based pedagogies, and for collaborative digital cultures to strengthen and develop a more resilient, equitable and future ready learning environment.

Based on these results, public secondary schools are suggested to step up their in-service training and regular Learning Action Cell (LAC) on Advanced Application of Information and Communication Technology in Teaching, namely in Content Development and Digital Organization. It is advisable for school administrators to use time and effort to improve the ICT infrastructure and security of data in their school based on support available to them from the Central Office of DepEd. The following collaborative school based policies should be established to promote access to digital technology that is equitable and pro-equality. The School Improvement Plan may serve as an example or model plan to move forward with continuous and scalable technology integration in instruction and administration. -- Future researchers can extend this research to also incorporate the use of private schools (for comparison) or other education levels to compare learning outcomes and administrative efficiency as they could be a part of the proposed Improvement Plan, and/or they can investigate the longitudinal effect of the proposed Improvement Plan on learning outcomes and administrative efficiency.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Felicito R. Dolor Jr	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki and approved by the relevant institutional authorities.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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