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Enhancing Educators' Digital Proficiency: A Study of Professional Development Strategies

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Abstract:

This study examined the digital proficiency integration of teachers at Compostela Central School, Compostela, Cebu, during School Year 2023-2024, and used the findings as the basis for a Digital Proficiency Action Plan for Educators. Using an explanatory sequential mixed-methods design, quantitative data were collected from 40 purposively selected teacher-respondents through a researcher-made survey questionnaire, and qualitative data were then gathered through interviews to explain and deepen the survey results. Descriptive statistics, Pearson correlation, and thematic analysis were used. Results showed that the faculty was predominantly female (62.5%), aged 31-40 years (32.5%), and graduate-educated, with 62.5% holding MA/MS units or a completed MA/MS degree. Most teachers (72.5%) had attended one to six digital proficiency trainings. The overall level of digital proficiency integration was Agree (weighted mean = 3.09, SD = 0.55). Teachers were strongest in internet navigation (M = 3.65), browser use (M = 3.52), and file management (M = 3.38), but weakest in modifying learning management system content and assessments (M = 2.67), troubleshooting hardware and software (M = 2.73), and resolving internet errors and accessing digital libraries (both M = 2.85). Trainings attended ($r = 0.709$, $p < 0.001$), combined monthly income ($r = 0.463$, $p = 0.003$), and highest educational attainment ($r = 0.335$, $p = 0.035$) were significantly related to integration, while age, gender, number of children, and specialization were not. Two qualitative themes emerged: positive experiences in digital instruction, including more efficient communication, more interactive lessons, and wider access to materials; and persistent challenges, including unstable connectivity, limited troubleshooting skill, low confidence in learning management systems, and unfamiliarity with digital libraries. The study concludes that basic digital literacy is already established, but advanced, applied, and supported proficiency requires sustained, differentiated, and practice-based professional development. A five-component action plan on learning management systems, technical self-reliance, continuous capacity building, digital resource navigation, and peer mentoring is proposed.

Keywords: digital proficiency, professional development, technology integration, educators, learning management system, action plan

Introduction:

Digital technology has changed what it means to teach well. A teacher today is expected not only to know the subject and manage a classroom, but also to select appropriate digital tools, design technology-supported learning activities, communicate through online platforms, assess learning with digital instruments, and guide learners to use information responsibly. In the Philippines, this expectation intensified during and after the COVID-19 pandemic, when schools shifted rapidly to modular, online, and blended modalities. Many teachers learned new platforms under pressure, often with limited devices, unstable connectivity, and little time for guided practice. The result, in many schools, was uneven: basic digital tasks became routine, while more complex tasks such as managing a learning management system (LMS), modifying online assessments, troubleshooting technical problems, and curating digital resources remained difficult.

At Compostela Central School in Compostela, Cebu, school leaders observed the same pattern. Teachers used the internet, browsers, messaging applications, and presentation tools in daily work, yet they reported difficulty when lessons depended on an LMS, when a device or connection failed, or when they needed to locate credible materials in a digital library. This gap matters because digital proficiency is not merely a technical accomplishment. When a teacher cannot modify an online quiz, resolve a browser error, or find a suitable digital text, instructional time is lost, learner engagement declines, and the promise of technology-enhanced learning is not realized. Conversely, when

teachers are confident and supported, digital tools can make lessons more interactive, feedback faster, and learning resources more varied and accessible.

This study therefore asked a practical and evidence-based question: what is the current level of digital proficiency integration among teachers at Compostela Central School, which teacher characteristics are associated with that level, what experiences explain the numbers, and what professional development response follows from the evidence? The study has three specific objectives. First, it describes the demographic profile of the teacher-respondents in terms of age, gender, highest educational attainment, combined monthly income, number of children, specialization, and number of digital proficiency trainings attended. Second, it determines the level of digital proficiency integration in instruction and tests whether demographic variables are significantly related to that level. Third, it explores teachers' positive and negative experiences in using digital instruction methods and translates the integrated findings into a Digital Proficiency Action Plan for Educators.

The contribution of the study is both diagnostic and practical. Diagnostically, it moves beyond a general claim that teachers need more training by identifying precisely which competencies are strong, which are weak, and which factors are most strongly associated with integration. Practically, it proposes an action plan that is anchored in the school's own data rather than in generic training topics. For school heads and master teachers, the findings support differentiated mentoring, protected time for practice, and investment in connectivity and technical support. For teachers, the findings affirm existing strengths while naming the next skills to develop. For the Department of Education and other partners, the findings support sustained, school-based, and practice-oriented professional development rather than one-off seminars. In short, this study treats digital proficiency as a professional competence that can be measured, explained, and deliberately developed.

A further reason for a school-level study is that national and division policies are enacted in classrooms. A policy on blended learning succeeds only when a teacher can open, adapt, and assess a digital lesson on a given day, with the devices and connectivity actually available in that school. Measuring proficiency at the school level therefore connects policy intent to classroom reality. It also allows school heads to allocate limited resources where they will matter most, rather than distributing the same training to everyone regardless of need. This local, diagnostic logic guided every decision in the present study, from the choice of indicators to the design of the action plan. The remainder of this paper is organized in IMRAD format. Section 2 reviews the literature on digital competence, professional development, and technology integration and presents the theoretical framework. Section 3 describes the methodology. Section 4 presents and discusses the results. Section 5 concludes the study and presents the proposed action plan in summary form.

Literature Review:

Digital proficiency and digital competence

Digital proficiency is commonly understood as more than the ability to operate a device. It includes locating, evaluating, creating, and sharing digital content; communicating and collaborating online; solving technical problems; and using technology safely and ethically for teaching and learning. Heine et al. (2023) emphasized that professional digital competence includes locating and using digital resources and also creating, modifying, managing, protecting, and sharing them.

This distinction is important for the present study because its weakest indicators involved modification, management, and troubleshooting rather than simple access. Similarly, Esparza et al. (2024) found that teachers often showed medium-to-high competence in information access, communication, and basic device use, but weaker competence in content creation and the pedagogical use of virtual learning environments. Tzafilkou et al. (2023) likewise argued that digital competence should integrate pedagogical and professional elements, so that teachers can use technology to support communication, collaboration, and instructional innovation rather than merely to deliver content.

Technology integration is strongest when technological, pedagogical, and content knowledge are connected. The Technological Pedagogical Content Knowledge (TPACK) framework (Koehler et al., 2018) holds that effective teaching with technology requires teachers to understand how a tool changes what can be taught, how it can be taught,

and how learners can engage with the content. In practice, this means that a Mathematics teacher may need simulations and graphing tools, a Science teacher may need virtual laboratories, and a language teacher may need collaborative writing and digital library resources.

Akram et al. (2022) found in a systematic review that technology integration can promote active student participation and improve the teaching-learning process when it is pedagogically purposeful. Alieto et al. (2024) added that teachers' attitude, technological competence, and access jointly shape teaching inside a digital classroom, which suggests that competence alone is insufficient without positive dispositions and reliable access. In the Philippine context, Dela Cruz (2022) and Andaya (2020) noted that Filipino teachers faced uneven readiness for digital education, while Manlangit et al. (2018) identified barriers in Cebu related to training, resources, and support. These findings justify a school-level diagnosis that links competence, subject specialization, and access.

Professional development that works

The literature is consistent that short, one-off training rarely changes classroom practice. Darling-Hammond et al. (2017) identified effective professional development as content-focused, incorporating active learning, supporting collaboration, using models of effective practice, providing coaching and expert support, offering feedback and reflection, and sustained in duration. Hennessy et al. (2022) found in a systematic review that technology use for teacher professional development in low- and middle-income countries was most promising when it was practice-oriented, collaborative, and supported over time. Boeskens et al. (2020) similarly argued that continuing professional learning should be coherent, school-embedded, and responsive to teachers' needs. In the Philippine post-pandemic context, Ancho and Arrieta (2021) and Anis (2024) emphasized that professional development must address teachers' evolving digital needs rather than assume that emergency remote teaching experience automatically produced durable digital competence. Kallunki et al. (2023) provided direct support for repetition: teachers who participated in ICT training more than three times reported more learning-focused approaches to online teaching than those with no ICT training. Reisoglu (2022) also found that digital competence training contributed to teachers' professional development activities and their capacity to integrate technology into instruction.

Research on demographic correlates is mixed, which makes local evidence valuable. Konstantinidou and Scherer (2022), using large-scale international data, found that technology use was shaped more by teacher and school characteristics, including professional learning opportunities and access to resources, than by demographic attributes alone. Galindo-Dominguez and Bezanilla (2021) reported that digital competence improved with higher educational attainment but did not differ significantly by gender or age. Zhang (2023) found that teachers' education level, gender, and teaching experience did not significantly influence digital literacy, whereas attitude toward technology, technology-use skills, and access were significant predictors.

Toker et al. (2024) found no significant association between age and teachers' digital competency based on the DigCompEdu framework. Baytar et al. (2023) found that teachers in science and activity-related subjects reported higher ICT-use competence than teachers in literary subjects, suggesting that specialization can shape the tools teachers use even when it does not predict overall competence. Gesta et al. (2023) found that income class, age, and gender did not significantly affect perceived barriers to technology integration, pointing instead to inadequate training, limited resources, and lack of technical support. Together, these studies suggest a hypothesis tested in the present study: training exposure and resource-related conditions are likely to matter more than age, gender, or specialization alone.

Barriers, support, and teachers' lived experience.

Teachers' accounts consistently identify the same obstacles: unstable connectivity, limited devices, insufficient technical support, time pressure, and low confidence in advanced tools. Nikolopoulou (2022) reported that technical problems and inadequate support were among the most common barriers to successful digital instruction. Gesta et al. (2023) likewise emphasized institutional barriers rather than individual reluctance. Family and workload pressures also matter. Njenga (2023) identified family commitments, conflicting continuing professional development schedules, cost, and lack of employer support as common barriers to participation in professional development. Su and Jiang (2023) found a significant negative relationship between work-family conflict and work engagement among

female university teachers, while perceived organizational support reduced that negative effect. These findings support flexible, modular, and school-supported training designs.

Theoretical framework

This study is anchored in constructivism, scaffolding, and TPACK. Constructivism holds that learners build knowledge through active engagement and experience; for teachers as learners, this means digital proficiency develops through hands-on practice, reflection, and application to real lessons rather than through lecture alone. Vygotsky's zone of proximal development and the idea of scaffolding imply that teachers progress faster when a more capable peer, mentor, or coach provides structured support that is gradually withdrawn as competence grows. This justifies peer mentoring, coaching, and guided LMS practice in the proposed action plan. TPACK provides the content of that scaffolding: training should connect a tool to a subject, a pedagogy, and a learning goal. Diffusion of Innovation theory (Garcia-Aviles, 2020) adds a further insight: adoption spreads when teachers see relative advantage, compatibility with their work, opportunities to try a tool, and observable results. A school plan that offers try-out lessons, peer demonstrations, and visible student engagement is therefore more likely to be adopted than a plan that only distributes manuals.

Digital competence frameworks

Frameworks such as DigCompEdu organize teacher digital competence into professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners digital competence. This organization is useful because it prevents a narrow focus on technical operation. A teacher may be able to operate a device yet still need support in selecting resources, designing assessment, and empowering learners to use technology safely and creatively. The present study reflects that broader view: its indicators cover file management and browsing, but also teaching learners, communicating online, modifying LMS assessments, and accessing digital libraries.

The pattern of results, in which operational indicators scored higher than pedagogical and managerial indicators, is exactly what a framework-based view would predict when training has emphasized operation over pedagogy. Future school assessments could therefore adopt a framework-based instrument to track progress across all six areas, rather than relying only on a general confidence scale. Such an instrument would also make it easier to compare results across schools and to align school training with division and national standards.

The literature establishes that digital competence is multidimensional, that effective professional development is sustained and practice-based, and that training and support are more consistent predictors of integration than age or gender alone. However, few school-level studies in Cebu combine a quantitative diagnosis of specific competencies, a correlational test of profile variables, and qualitative accounts of teachers' actual experiences in one explanatory design, and fewer still translate that evidence into a costed, school-owned action plan. This study addresses that gap. It tests the null hypothesis that there is no significant relationship between teachers' demographic profile and their level of digital proficiency integration, while using interviews to explain why certain competencies are strong and others remain weak.

Methodology:

Research design

This study used an explanatory sequential mixed-methods design (Creswell & Plano Clark, 2018). Quantitative data were collected and analyzed first to describe the profile of teachers, measure digital proficiency integration, and test relationships. Qualitative data were then collected through interviews to explain, confirm, and deepen the quantitative results. The quantitative phase carried the primary weight for measurement and hypothesis testing; the qualitative phase carried the explanatory weight for interpreting patterns, especially the contrast between strong basic skills and weak advanced skills. Integration occurred at interpretation: survey means and correlations were read alongside interview themes to produce a coherent account and a responsive action plan.

Research environment and respondents

The study was conducted at Compostela Central School, Compostela, Cebu, during School Year 2023-2024. The school is a public elementary school serving a diverse learner population and employing teachers across grade levels and subject specializations. Forty teacher-respondents participated through purposive sampling. Purposive sampling was appropriate because the study aimed to describe and improve practice in one school rather than to generalize to all schools in the division. All respondents were teaching personnel who used digital tools in instruction and were willing to participate. Informed consent was obtained, participation was voluntary, and responses were treated with confidentiality. No identifying information is reported in this paper.

Research instrument

Data were gathered with a researcher-made survey questionnaire in two parts. Part I collected the demographic profile: age, gender, highest educational attainment, combined monthly income, number of children, specialization, and number of digital proficiency trainings attended. Part II measured digital proficiency integration in instruction using 15 indicators rated on a four-point Likert-type scale: 4 = Strongly Agree, 3 = Agree, 2 = Disagree, and 1 = Strongly Disagree. The indicators covered file management, software installation, troubleshooting, use of educational software and online platforms, internet navigation and browser use, resolving internet errors, searching and downloading, accessing digital libraries, teaching learners to use digital tools, online communication, LMS content and assessment modification, and digital assessment. The instrument was reviewed by the thesis advisory committee and experts for content validity, and was pilot-tested and refined for clarity. A semi-structured interview guide was used in the qualitative phase. It asked teachers to describe positive experiences, challenges, coping strategies, and support needed when using digital instruction methods.

Data gathering procedure

After approval from the Graduate School and the school head, the researcher explained the purpose of the study, distributed the questionnaire, and gave respondents sufficient time to answer. Completed questionnaires were collected, checked for completeness, and encoded. Selected teachers were then invited for interviews. Interviews were conducted in a conversational manner, audio-recorded with permission where applicable, and transcribed for analysis. Interview excerpts are presented anonymously as teacher statements.

Data analysis

Quantitative data were analyzed with descriptive and inferential statistics. Frequency and percentage described the demographic profile. Weighted mean and standard deviation described the level of digital proficiency integration. Pearson product-moment correlation tested the relationship between each profile variable and digital proficiency integration at the 0.05 level of significance. The following scale was used: 3.26-4.00 = Strongly Agree (highly confident and proficient); 2.51-3.25 = Agree (confident and capable); 1.76-2.50 = Disagree (limited confidence and ability); and 1.00-1.75 = Strongly Disagree (not confident or capable). Qualitative data were analyzed through thematic analysis: familiarization with transcripts, open coding, grouping codes into categories, and refining categories into themes. Trustworthiness was supported by triangulation of survey results, interview data, and literature; by keeping an audit trail of codes and themes; and by checking interpretations against the quantitative patterns rather than selecting only confirming quotations.

Ethical considerations

The study observed informed consent, voluntary participation, confidentiality, and the right to withdraw without consequence. Data were used only for research and school improvement purposes. The action plan that follows is presented as a recommendation for school adoption, not as an imposed requirement on individual teachers.

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Conceptual Flow of the Study

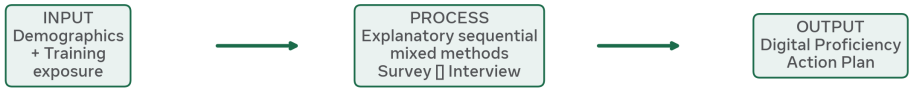

Figure 1. Conceptual flow of the study: input, process, and output.

Table 1. Interpretation scale for digital proficiency integration

Rating	Mean range	Descriptive rating	Interpretation
4	3.26-4.00	Strongly Agree	Highly confident and proficient
3	2.51-3.25	Agree	Confident and capable
2	1.76-2.50	Disagree	Limited confidence and ability
1	1.00-1.75	Strongly Disagree	Not confident or capable

Results and Discussion:

This section presents the demographic profile of the teacher-respondents, the level of digital proficiency integration in instruction, the test of relationship between profile and integration, and the qualitative experiences that explain the quantitative patterns. Each result is followed by discussion that connects the school-level evidence to the wider literature. Together, the four parts support one central interpretation: basic digital proficiency is already established at Compostela Central School, but advanced, applied proficiency depends on repeated training, accessible resources, and sustained school support.

Demographic profile of the teacher-respondents

The demographic profile provides the context for interpreting digital proficiency. A faculty that is younger, graduate-educated, and already exposed to training may be expected to integrate technology more readily than a faculty without those characteristics. The profile also identifies who may need differentiated support. Table 2 summarizes the distribution of the 40 respondents across seven variables.

Table 2. Demographic profile of the teacher-respondents (N = 40)

Variable	Category	f	%
Age	21-30 years	10	25.0
	31-40 years	13	32.5
	41-50 years	9	22.5
	51-60 years	5	12.5
	Above 60 years	3	7.5
Gender	Female	25	62.5
	Male	15	37.5
Highest education	Baccalaureate	9	22.5
	With MA/MS units	13	32.5
	MA/MS degree	12	30.0

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	With PhD/EdD units	4	10.0
	PhD/EdD degree	2	5.0
Combined monthly income	Php 9,001-19,000	4	10.0
	Php 19,001-29,000	11	27.5
	Php 29,001-39,000	14	35.0
	Php 39,001-49,000	7	17.5
	Php 50,000 and above	4	10.0
Number of children	None	10	25.0
	2 and below	12	30.0
	3 to 5	12	30.0
	4 to 6	4	10.0
	7 to 9	2	5.0
Specialization	General Education	5	12.5
	Special Education	3	7.5
	Mathematics	8	20.0
	Science	8	20.0
	English	6	15.0
	Filipino	4	10.0
	Araling Panlipunan	4	10.0
	Others	2	5.0
Trainings attended	None	2	5.0
	1 to 3	13	32.5
	4 to 6	16	40.0
	7 to 10	6	15.0
	11 and above	3	7.5

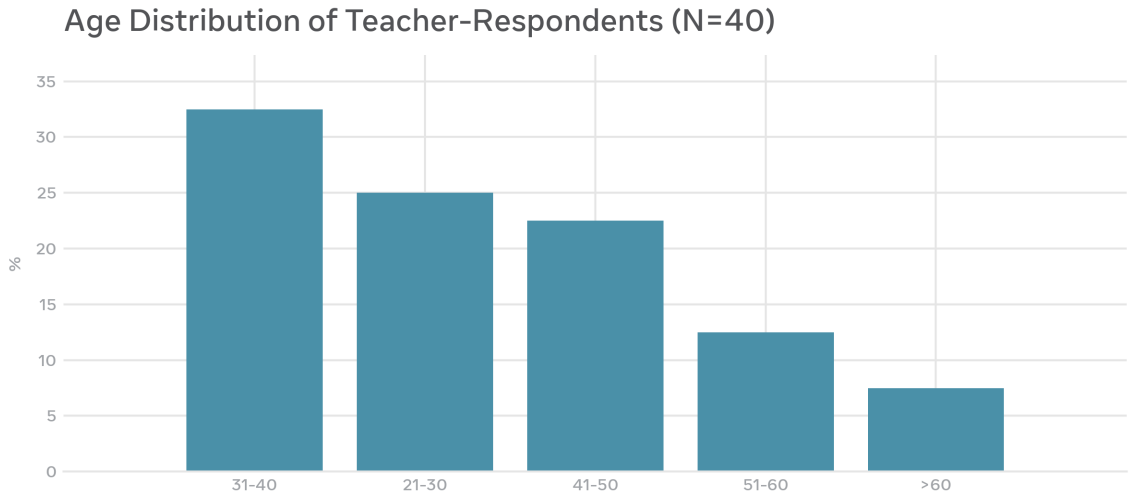

Figure 2. Age distribution of teacher-respondents (N = 40).

Age and gender

The largest age group was 31-40 years (13 teachers, 32.5%), followed by 21-30 years (10, 25.0%) and 41-50 years (9, 22.5%). Teachers aged 51-60 years numbered five (12.5%), and those above 60 years numbered three (7.5%). In terms of gender, female teachers dominated the faculty (25, 62.5%), while male teachers numbered 15 (37.5%). The profile therefore describes a predominantly young-to-middle-aged, female faculty. This distribution mirrors the general feminization of basic education teaching in the Philippines and suggests a workforce that is still in a developmental

stage in which new learning is plausible and professionally rewarding. At the same time, the presence of eight teachers aged 51 years and above means that any professional development plan must be intergenerational. Younger teachers may need advanced and innovative applications, while older teachers may benefit from foundational, hands-on, and peer-mentored sessions that respect experience and avoid stereotyping. The correlational test in Section 4.3 shows that age itself was not significantly related to integration, which cautions against assuming that younger teachers are automatically more digitally proficient. Age should therefore be used to design differentiated support, not to label teachers.

Highest educational attainment

The faculty was highly graduate-oriented. Thirteen teachers (32.5%) had MA/MS units and 12 (30.0%) had completed an MA/MS degree, so 62.5% were at master's level. Four teachers (10.0%) had doctoral units and two (5.0%) had completed a doctorate. Only nine teachers (22.5%) held a baccalaureate degree as their highest attainment. This pattern suggests strong academic preparation and a culture of continuing study. Graduate education may support reflective practice, research skills, and openness to innovation, all of which can help teachers evaluate digital tools critically rather than adopt them superficially. However, as discussed in the literature review, graduate education is not a guarantee of digital competence. Zhang (2023) found that education level did not significantly predict digital literacy, while attitude, skills, and access did. The present study's correlation for education was significant but modest ($r = 0.335$), consistent with the view that graduate study is an asset that must be paired with hands-on digital practice. A practical implication is to use graduate-educated teachers as mentors and resource persons, while ensuring that teachers with only a baccalaureate degree receive targeted, non-stigmatizing support.

Combined monthly income

Most teachers belonged to middle-income brackets. Fourteen teachers (35.0%) reported Php 29,001-39,000, and 11 (27.5%) reported Php 19,001-29,000, so 62.5% fell between Php 19,001 and Php 39,000. Seven teachers (17.5%) reported Php 39,001-49,000, while the lowest bracket (Php 9,001-19,000) and the highest bracket (Php 50,000 and above) each had four teachers (10.0%). The middle-income concentration suggests that most teachers could meet basic needs but may have had limited discretionary income for advanced devices, paid online courses, or home internet upgrades. Income should not be read as a measure of a teacher's worth or effort; it is a contextual condition that shapes access. The significant correlation between income and integration ($r = 0.463$) is therefore best interpreted as evidence that resource access matters. When the school provides devices, connectivity, free training, and shared digital resources, the income gradient in proficiency should narrow. This is consistent with OECD (2022) evidence that uneven access to digital technology is associated with differences in digital self-efficacy, particularly when schools provide sufficient ICT resources and relevant professional development. The action plan therefore emphasizes institutional provision rather than expecting individual teachers to self-finance their upskilling.

Number of children and family responsibilities

Twelve teachers (30.0%) reported two children and below, and another 12 (30.0%) reported three to five children. Ten teachers (25.0%) reported no children, four (10.0%) reported four to six children, and two (5.0%) reported seven to nine children. The majority (60.0%) were raising one to five children while fulfilling full teaching duties. Family responsibilities can compete with time and energy for professional development, especially when training is scheduled after school hours or on weekends. Yet the correlational test shows that number of children was not significantly related to integration ($r = -0.044$, $p = 0.788$). The correct interpretation is not that family responsibilities are irrelevant, but that they do not determine digital proficiency in a simple linear way. Teachers with larger families may still integrate technology well if training is flexible, modular, and school-supported. Njenga (2023) identified family commitments and conflicting schedules as barriers to continuing professional development, while Su and Jiang (2023) showed that perceived organizational support can reduce the negative effect of work-family conflict on engagement. The implication is design-based: offer asynchronous options, modular sessions, repeated schedules, and peer support so that participation does not depend on a teacher's domestic load.

Specialization

Mathematics and Science each had eight teachers (20.0%), followed by English with six (15.0%), General Education with five (12.5%), Filipino and Araling Panlipunan with four each (10.0%), Special Education with three (7.5%), and Others with two (5.0%). Together, Mathematics, Science, and English accounted for 55.0% of the faculty, reflecting the school's emphasis on foundational subjects. Specialization matters pedagogically because different subjects afford different digital tools. Mathematics and Science teachers may use simulations, graphing software, and virtual laboratories; English and Filipino teachers may use collaborative writing platforms, digital libraries, and multimedia texts; Araling Panlipunan teachers may use maps, timelines, and primary-source databases; and Special Education teachers need accessible and assistive technologies. The correlational test shows that specialization was not significantly related to overall integration ($r = -0.095$, $p = 0.561$), which means that no subject group was uniformly ahead or behind on the general scale. Training should therefore be differentiated by subject application rather than by ranking subjects. Interdisciplinary sharing, in which teachers demonstrate a subject-specific digital lesson to colleagues, can make training concrete and transferable.

Digital proficiency trainings attended

Most teachers had moderate exposure to training. Sixteen teachers (40.0%) had attended four to six trainings, 13 (32.5%) had attended one to three, six (15.0%) had attended seven to ten, and three (7.5%) had attended 11 or more. Two teachers (5.0%) had attended none. Thus 72.5% had attended one to six trainings, and only 22.5% had attended seven or more. This pattern suggests that basic exposure was available, but sustained and advanced training was limited. The two teachers with no training are a small but important equity concern: in a school where digital instruction is expected, no teacher should be left without at least foundational preparation. The strong correlation between trainings attended and integration ($r = 0.709$) makes this variable the central lever for improvement. It also aligns with Kallunki et al. (2023), who found that repeated ICT training was associated with more learning-focused online teaching, and with Fernandez-Batanero et al. (2022), who identified professional development as a key mechanism for strengthening teachers' digital competences. The school should therefore institutionalize a training ladder from foundational to advanced, track participation, and follow up each training with classroom application.

Level of digital proficiency integration in instruction

The core quantitative result is the level of digital proficiency integration. The overall weighted mean was 3.09 (SD = 0.55), interpreted as Agree. This means that, on average, teachers felt confident and capable of integrating digital tools into instruction, but not yet highly confident or highly proficient across all tasks. The overall mean hides a clear internal pattern: teachers were strongest in everyday, low-threshold tasks and weakest in advanced, system-dependent tasks. Table 3 and Figure 3 make this pattern visible.

Table 3. Level of digital proficiency integration in instruction

Indicator	Mean	SD	Rating
Surf internet / navigate web pages	3.65	0.48	Strongly Agree
Use web browsers confidently	3.52	0.55	Strongly Agree
Save / open documents on storage devices	3.38	0.63	Strongly Agree
Use online communication tools with learners	3.35	0.62	Strongly Agree
Search, bookmark, download files	3.30	0.65	Strongly Agree
Use educational software / online platforms	3.17	0.68	Agree
Teach learners to use digital tools	3.05	0.68	Agree
Assess / evaluate learning with digital tools	3.05	0.68	Agree

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Install software / modify settings	2.92	0.66	Agree
Resolve common internet errors	2.85	0.62	Agree
Access distance learning library / databases	2.85	0.74	Agree
Resolve hardware / software issues / access support	2.73	0.72	Agree
Modify / add LMS content and assessments	2.67	0.73	Agree
Overall weighted mean	3.09	0.55	Agree

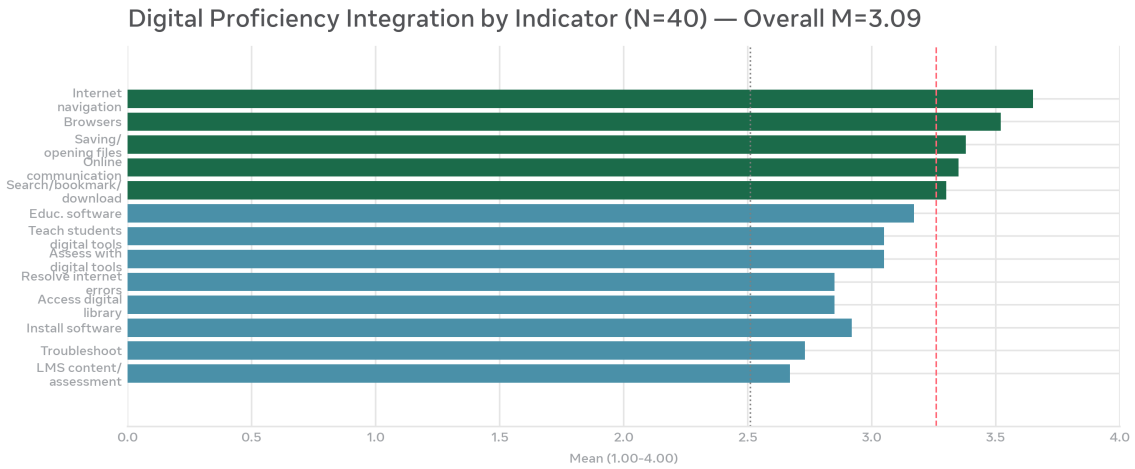

Figure 3. Digital proficiency integration by indicator. Dark green bars reach Strongly Agree (at least 3.26); blue bars are in the Agree range. The dashed red line marks the Strongly Agree threshold.

Strengths: everyday digital literacy

The five Strongly Agree indicators all involve routine operations that teachers practice daily. Internet navigation (M = 3.65, SD = 0.48) and browser use (M = 3.52, SD = 0.55) had the highest means and the smallest standard deviations, indicating both high confidence and relatively consistent performance across teachers. Saving and opening documents (M = 3.38), using online communication tools (M = 3.35), and searching, bookmarking, and downloading (M = 3.30) were also in the Strongly Agree range. These strengths are educationally meaningful. A teacher who can find materials, communicate with learners, and organize files can sustain blended and modular learning, provide timely feedback, and share resources efficiently. The qualitative data confirm that these strengths were used in practice: teachers reported that digital tools helped them communicate announcements, assignments, and feedback more efficiently and that online platforms made lessons more interactive. The consistency of these indicators suggests that foundational digital literacy is no longer the school's primary problem.

Middle range: pedagogical application

Indicators in the upper Agree range show that teachers were moving from personal use to instructional use. Using educational software and online platforms to enhance teaching (M = 3.17), teaching learners to use digital tools (M = 3.05), and assessing learning with digital tools (M = 3.05) all fell in the Agree range. These means are encouraging but also reveal a gap between using a tool and using it to improve learning. A teacher may be comfortable opening a platform yet uncertain how to design a digital assessment that measures understanding, provides useful feedback, and accommodates learners with different needs. The standard deviations around 0.68 for these items also indicate variability: some teachers were already confident, while others were still developing. This variability supports

differentiated coaching rather than a single whole-faculty lecture. Peer demonstration, lesson study, and co-planning can help teachers see how a colleague uses the same tool for a specific learning goal.

Weaknesses: troubleshooting, LMS, and resource navigation

The three lowest indicators define the school's priority agenda. Modifying and adding content and assessments in an LMS had the lowest mean (M = 2.67, SD = 0.73). Resolving standard hardware or software issues, or knowing how to access technical support, was next (M = 2.73, SD = 0.72). Resolving common internet errors (M = 2.85, SD = 0.62) and accessing a distance learning library and other resource databases (M = 2.85, SD = 0.74) were also at the bottom. Installing software and modifying configuration settings (M = 2.92) was only slightly higher. These are not trivial skills. When a teacher cannot modify an LMS quiz, a lesson cannot be adapted to learners' needs. When a teacher cannot resolve a browser error, instructional time is lost. When a teacher cannot navigate a digital library, the quality and variety of learning materials suffer. The larger standard deviations for these items (0.72-0.74) also suggest that some teachers were considerably less confident than others, which reinforces the need for targeted, hands-on support rather than general awareness sessions. Heine et al. (2023) emphasized that professional digital competence includes creating, modifying, managing, and sharing resources, not only locating them. Esparza et al. (2024) likewise found weaker competence in content creation and pedagogical use of virtual environments. The present results fit that pattern precisely.

What the pattern means

The profile of strengths and weaknesses suggests a developmental sequence. Teachers first master access and communication, then begin to apply tools to teaching, and only later master management, adaptation, and troubleshooting. Compostela Central School is at the transition from the second to the third stage. Professional development should therefore be sequenced in the same way: consolidate strengths, then provide deliberate practice in the weakest skills, with scaffolding and follow-up. A workshop on LMS assessment design, for example, should not end with a demonstration. It should require each teacher to build or modify one complete quiz unit, receive feedback, and try it with learners. A troubleshooting workshop should provide a quick-reference guide, a school helpdesk routine, and practice with common errors. A digital library workshop should include guided searches, curation of a subject-specific resource list, and a lesson that uses at least one library resource. This practice-based logic is consistent with Darling-Hammond et al. (2017) and with the constructivist and scaffolding framework of the study.

Relationship between demographic profile and digital proficiency integration

Table 4 reports the Pearson correlations between each demographic variable and digital proficiency integration. The null hypothesis was that there is no significant relationship. That hypothesis is rejected for three variables and retained for four.

Table 4. Relationship between demographic profile and digital proficiency integration (N = 40)

Profile variable	Pearson r	p-value	Decision	Interpretation
Trainings attended	+0.709	<0.001	Reject Ho	Highly significant
Combined monthly income	+0.463	0.003	Reject Ho	Significant
Highest educational attainment	+0.335	0.035	Reject Ho	Significant
Gender	-0.299	0.061	Fail to reject Ho	Not significant
Age	-0.114	0.484	Fail to reject Ho	Not significant
Specialization	-0.095	0.561	Fail to reject Ho	Not significant
Number of children	-0.044	0.788	Fail to reject Ho	Not significant

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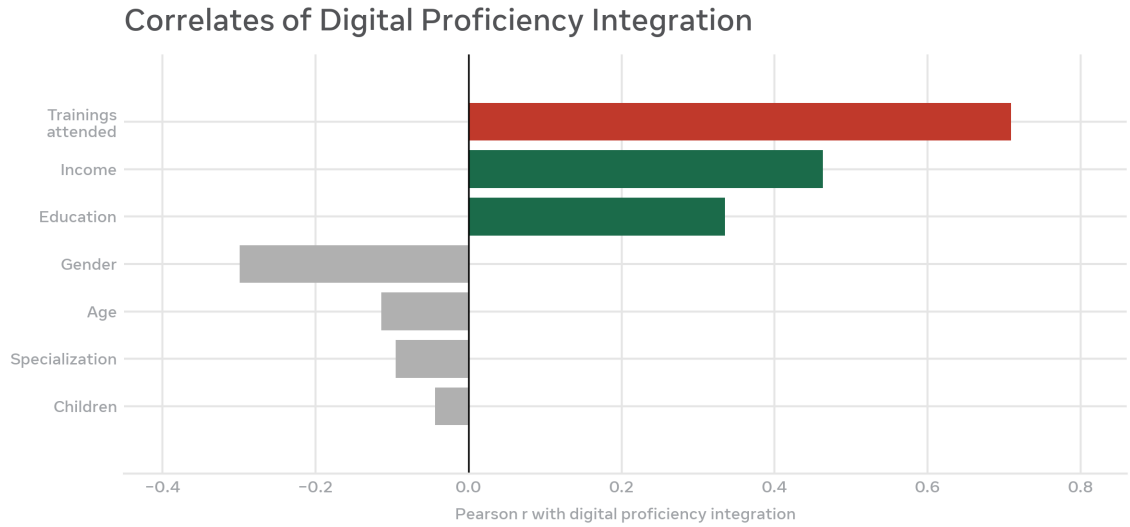

Figure 4. Pearson correlations with digital proficiency integration. Red indicates a strong correlation; dark green indicates a moderate significant correlation; gray indicates a non-significant correlation.

Trainings attended: the strongest correlate

The number of digital proficiency trainings attended had a strong positive correlation with integration ($r = 0.709$, $p < 0.001$). In practical terms, teachers who had attended more trainings tended to report higher integration. The size of the correlation is notable: it is large by conventional standards and substantially larger than any other correlate in the study. This does not prove that training alone caused higher proficiency, because teachers who were already motivated or supported may have sought more training, and schools may have selected confident teachers for advanced sessions. Nevertheless, the association is strong, consistent with prior research, and directly actionable. It supports a school policy of ensuring that every teacher completes a minimum number of trainings per year, with a progression from foundational to advanced topics, and with follow-up application in the classroom. It also supports monitoring participation so that the two teachers with no training and the 13 teachers with only one to three trainings are prioritized.

Income and education: moderate, significant correlates

Combined monthly income was moderately and positively correlated with integration ($r = 0.463$, $p = 0.003$), and highest educational attainment was also positively correlated, though more modestly ($r = 0.335$, $p = 0.035$). Both results should be interpreted as resource and background conditions rather than as personal deficits. Higher income may make it easier to own a device, maintain home internet, and enroll in paid courses. Higher education may support critical thinking, reflection, and openness to innovation. Neither variable, however, guarantees digital proficiency. A teacher with high income but no relevant training may still struggle with an LMS, while a teacher with modest income but repeated, well-supported training may integrate technology well. The policy implication is to reduce the resource gradient: provide school devices, shared resources, free training, and connectivity support, and encourage graduate study without treating it as a substitute for digital practice. Galindo-Dominguez and Bezanilla (2021) similarly found that digital competence improved with higher educational attainment, while Konstantinidou and Scherer (2022) emphasized that professional learning opportunities and school resources shape technology use more than demographic attributes alone.

Non-significant variables: age, gender, children, and specialization

Age ($r = -0.114$, $p = 0.484$), gender ($r = -0.299$, $p = 0.061$), number of children ($r = -0.044$, $p = 0.788$), and specialization ($r = -0.095$, $p = 0.561$) were not significantly related to integration. The gender correlation approached but did not reach significance, and with a sample of 40 it should not be overinterpreted. The overall message is that

digital proficiency at this school was not determined by being younger, male or female, having fewer children, or teaching a particular subject. This is good news for equity: it means that professional development can be inclusive and that no demographic group should be assumed to be behind or ahead. It also aligns with Toker et al. (2024), who found no significant association between age and digital competency, and with Zhang (2023), who found that gender and teaching experience did not significantly predict digital literacy. The non-significant results do not mean that age, gender, family load, and specialization are irrelevant to training design. They mean that these variables should inform how training is delivered, for example through flexible scheduling, subject-specific examples, and peer mentoring, rather than being used to predict who will succeed.

Methodological caution

The sample size of 40 limits statistical power and generalizability. Pearson correlation assumes linear relationships and treats ordinal demographic categories as numeric, which is a simplification. Self-reported proficiency may be influenced by confidence and social desirability. The study is cross-sectional, so it cannot establish causation. These limitations do not invalidate the findings, but they require careful language: the study reports associations, not causes, and its recommendations are for school-level action and further evaluation rather than for division-wide generalization. Future research should use a larger sample, a validated digital competence instrument such as DigCompEdu, classroom observation, and a longitudinal or quasi-experimental design to test whether a structured training program improves proficiency over time.

Teachers' experiences with digital instruction: qualitative findings

Interviews produced two major themes that explain the quantitative pattern. Theme 1 captures positive experiences. Theme 2 captures persistent challenges. Together they show that teachers valued digital tools and used them meaningfully, but that their confidence was fragile when technology failed or when advanced tasks were required.

Theme 1: Positive experiences in digital instruction. Teachers described digital tools as making communication, lesson preparation, and learner engagement easier and more efficient. One teacher said, 'Digital tools helped me communicate with my students more efficiently, especially when providing announcements, assignments, and feedback.' Another shared, 'Using online platforms made my lessons more interactive because students participated actively during discussions and activities.' A third noted, 'I became more confident in guiding learners on how to use digital resources and online learning materials.' Other teachers emphasized access to materials: 'The internet enabled me to access a variety of teaching materials that enhanced the quality of my lessons,' and 'Digital tools made it easier to prepare instructional materials and present lessons in a more engaging manner.'

These accounts are consistent with the survey's Strongly Agree indicators for communication, internet navigation, and file management. They also align with Akram et al. (2022), who found that technology integration promotes active participation and improves the teaching-learning process, and with Tzafilkou et al. (2023), who argued that digitally competent teachers are better able to support communication, collaboration, and instructional innovation. The positive theme matters for professional development because it provides a motivational foundation. Training can build on what teachers already value, use their successful lessons as models, and invite them to demonstrate practices to peers. A deficit-only narrative would miss this asset.

Theme 2: Challenges encountered in digital instruction. Teachers also described concrete obstacles. One teacher said, 'I often experience difficulties when internet connectivity becomes unstable during online activities.' Another shared, 'There are times when software or hardware problems interrupt my lessons, and I do not always know how to troubleshoot them.' A participant commented, 'I am not fully confident in modifying assessments and content within learning management systems.' Another stated, 'Accessing online databases and digital libraries can be difficult because I am not familiar with all the available resources.' A further teacher noted, 'Technical issues sometimes consume valuable instructional time and affect the flow of classroom activities.' These statements map directly onto the lowest survey indicators: LMS modification, troubleshooting, resolving internet errors, and digital library access. The convergence of survey and interview evidence strengthens confidence in the diagnosis. It also shows that the challenges are not abstract: they are moments in a lesson when time is lost, flow is broken, and a teacher must choose between continuing with a familiar method and struggling with a tool. Nikolopoulou (2022) reported that technical

problems and inadequate support are common barriers, while Fernandez-Batanero et al. (2022) emphasized that continuous professional development and practical training are needed for advanced digital competencies. The implication is that support must be available at the point of need, not only in a workshop. A school helpdesk routine, a quick-reference troubleshooting guide, a peer mentor on call, and a curated list of digital library resources can reduce the cost of a technical failure and preserve instructional time.

Integration of quantitative and qualitative findings

The explanatory sequential design is visible in the way the two phases fit together. The survey answered what and how much: teachers were confident in basic tasks, less confident in advanced tasks, and more integrated when they had more training, higher income, and higher education. The interviews answered why and how: teachers used digital tools because they made communication and lesson delivery better, but they hesitated or lost time when connectivity failed, when a device malfunctioned, or when an LMS or database task exceeded their practiced skill. This integration supports a differentiated action plan. Basic skills need consolidation and peer sharing. Advanced skills need scaffolded practice, coaching, and technical support. Resource gaps need institutional provision. Motivation is already present; the missing elements are practice, support, and time.

Cross-cutting discussion: why basic skills are strong and advanced skills are weak

Three explanations together account for the gap between basic and advanced proficiency. The first is frequency of practice. Teachers navigate the internet, open browsers, save files, and send messages every day, so these skills are rehearsed and reinforced. LMS modification, troubleshooting, and database searching are episodic: they are needed when a new unit is built, when a device fails, or when a research task is assigned. Skills that are practiced rarely decay faster and feel riskier, especially when failure is visible to learners. Professional development should therefore increase the frequency of low-stakes practice in advanced skills, for example through short weekly LMS tasks, a troubleshooting drill, or a guided library search tied to an upcoming lesson, so that advanced skills become routine rather than exceptional.

The second explanation is support at the point of need. Basic tasks can be completed alone; advanced tasks often require help, a stable connection, a working device, or permission to modify a system. When support is slow or unavailable, teachers rationally revert to a familiar method. This is not resistance; it is a sensible response to risk. A school that wants advanced integration must therefore reduce the cost of trying: a helpdesk routine, a peer mentor on call, a backup offline activity, and a quick-reference guide all make it safer to attempt an LMS task or a new digital resource. Over time, successful attempts build self-efficacy, which in turn makes the next attempt more likely. This cycle is consistent with scaffolding: support is provided when needed and withdrawn as competence grows, rather than provided once in a workshop and then removed.

The third explanation is the difference between knowing a tool and knowing how to teach with it. TPACK predicts that a teacher can know how to use a browser without knowing how to design a digital assessment that measures understanding. The middle-range means for educational software, teaching learners, and digital assessment reflect this transition. Teachers are beginning to use tools pedagogically but need models, feedback, and co-planning to do so well. Lesson study, in which a small group of teachers jointly plans, observes, and revises a technology-supported lesson, is well suited to this need because it makes pedagogical reasoning visible. A Mathematics group might jointly design a graphing task, a Science group a virtual laboratory task, and a language group a collaborative writing task, each with a clear learning goal, a digital activity, and a digital assessment. Sharing the revised lessons across the faculty then spreads both the tool skill and the pedagogy.

Together, these explanations suggest that the school should not treat low LMS and troubleshooting means as evidence that teachers are unwilling or unable. The evidence points instead to insufficient practice, insufficient point-of-need support, and insufficient pedagogical modeling. Each of these is remediable through the action plan. The plan's emphasis on hands-on LMS workshops, a troubleshooting guide and support routine, and peer mentoring directly addresses the three explanations. The plan's emphasis on continuous training addresses frequency: a single workshop cannot make an episodic skill routine, but a cycle of workshops, practice, feedback, and peer sharing can. Evaluation should therefore track not only mean scores but also frequency of LMS use, number of troubleshooting incidents

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resolved without external help, and number of lessons that use a digital library resource. These behavioral indicators will show whether practice and support are actually changing classroom routines.

What the non-significant results do and do not mean

It is tempting to read non-significant correlations as proof that age, gender, family size, and specialization do not matter. That reading would be too strong. With 40 respondents, the study had limited power to detect small effects, and the gender correlation ($r = -0.299$, $p = 0.061$) was close to the conventional threshold. A larger sample might find a small gender difference, and a different instrument might detect subject-specific differences that a general scale misses. The correct reading is more modest: in this school, with this instrument, these variables did not show a clear linear relationship with overall integration, while training, income, and education did. This finding is still useful because it shifts attention from fixed characteristics to malleable conditions.

School leaders cannot change a teacher's age or family size, but they can change training frequency, resource access, and support. Professional development should therefore be designed around malleable conditions while remaining sensitive to fixed characteristics in how it is delivered. For example, flexible scheduling respects family responsibilities without assuming that teachers with larger families are less capable, and subject-specific examples respect specialization without ranking subjects. This distinction between prediction and design is central to the study's recommendations: demographic variables are used to design inclusive delivery, not to predict who will succeed.

Implications for professional development and the proposed action plan

The findings point to five priorities that are summarized in Table 5 and elaborated in the conclusion. First, LMS and assessment management must be taught through hands-on workshops in which each teacher builds or modifies a complete quiz unit and receives feedback. Second, technical self-reliance must be strengthened through basic hardware and troubleshooting training, a quick-reference guide, and a clear school support routine. Third, continuous capacity building must be institutionalized so that every teacher completes at least four trainings per year, with modular and self-paced options. Fourth, digital resource and library navigation must be taught through guided practice and a curated, subject-specific resource list. Fifth, peer mentoring and collaborative learning must be formalized so that digitally proficient teachers support colleagues and share best practices.

These priorities are not separate projects; they form a coherent system in which training, mentoring, resources, and support reinforce one another. The plan is costed in the original thesis at Php 58,000 across the five components, drawn from school MOOE, PTA, LGU, library, and partnership sources, with implementation across four quarters. The plan's expected outcomes are measurable: every teacher deploys at least one complete digital quiz unit, troubleshooting confidence rises above the Strongly Agree threshold, every teacher completes at least four trainings per year, digital library use increases, and collaboration strengthens. Evaluation should include a repeat survey after one school year, classroom observation of LMS use, and a review of training participation records.

Table 5. Summary of the proposed Digital Proficiency Action Plan for Educators

Component	Objective	Key strategy	Indicative budget (Php)
1. LMS and assessment management	Enhance skills in creating, modifying, and assessing LMS modules	Hands-on LMS workshop; follow-up coaching	15,000
2. Technical self-reliance	Reduce downtime from software, browser, and system glitches	Basic troubleshooting training; quick-reference guide; school support routine	10,000
3. Continuous capacity building	Provide continuous, progressive access to technology integration training	Institutionalized ICT seminars; modular / self-paced options; peer learning	20,000

4. Digital resource and library navigation	Enhance proficiency in accessing digital libraries and databases	Workshops on digital libraries; guided practice; curated resource list	8,000
5. Peer mentoring and collaborative learning	Foster a supportive, collaborative learning environment	Peer mentoring pairs; regular learning sessions; sharing of best practices	5,000
Total			58,000

Limitations and directions for future research

This study was conducted in one school with 40 teachers, so its results should not be generalized to all schools in Cebu or the Philippines. The instrument was researcher-made and self-reported, and the analysis was correlational. Future studies should replicate the design in multiple schools, use a validated digital competence framework, include classroom observation and learner outcomes, and evaluate the action plan with a pre-post or quasi-experimental design. Future research should also examine the role of school leadership, ICT infrastructure, and technical support as school-level predictors, and explore how teachers' digital proficiency relates to learners' engagement and achievement. Despite these limitations, the study provides a clear, school-owned diagnosis and a practical, evidence-based response.

Conclusion:

Teachers at Compostela Central School entered this study with a solid foundation in digital proficiency and left the diagnosis with a clear agenda for growth. The overall level of digital proficiency integration was Agree (M = 3.09), which means that teachers were confident and capable in integrating digital tools into instruction, but not yet highly proficient across all tasks. Their strengths were in everyday digital operations: navigating the internet, using browsers, managing files, communicating online, and searching and downloading resources. Their weaknesses were in the advanced, system-dependent tasks that determine whether technology can be sustained in a lesson: modifying LMS content and assessments, troubleshooting hardware and software, resolving internet errors, and accessing digital libraries and databases. This pattern is not a failure; it is a developmental stage. It shows that basic digital literacy has taken hold and that the next stage requires deliberate, practice-based professional development.

Three variables were significantly related to integration: trainings attended ($r = 0.709$, $p < 0.001$), combined monthly income ($r = 0.463$, $p = 0.003$), and highest educational attainment ($r = 0.335$, $p = 0.035$). Age, gender, number of children, and specialization were not significantly related to integration. The strongest message is that participation in professional development matters most. When teachers have repeated, relevant, and supported opportunities to practice digital skills, their integration improves. Income and education matter as resource and background conditions, but they do not determine a teacher's capacity. No demographic group should be assumed to be behind or ahead. The qualitative findings reinforce this interpretation: teachers valued digital tools for communication, interactivity, and access to materials, but they lost instructional time when connectivity failed, when devices malfunctioned, or when LMS and library tasks exceeded their practiced skill.

For practice, the study recommends that Compostela Central School adopt the proposed Digital Proficiency Action Plan with five components: LMS and assessment management, technical self-reliance, continuous capacity building, digital resource and library navigation, and peer mentoring and collaborative learning. The plan should be implemented across four quarters, with measurable targets, protected time for practice, school-provided resources, and a repeat survey after one school year to evaluate progress. School leaders should prioritize teachers with no or limited training, provide flexible and modular options for teachers with family responsibilities, and use graduate-educated and digitally proficient teachers as mentors. The Department of Education, local government, and partners can support this work by funding training, improving connectivity, and recognizing school-based professional development. Digital proficiency is not a one-time achievement; it is a professional competence that grows through practice, scaffolding, collaboration, and sustained support. When schools invest in those conditions, teachers can use technology not merely to deliver content, but to create more interactive, inclusive, and meaningful learning for every learner.

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