

Original Article

Teachers' 21st Century Skills on Digital Competence and Self-Efficacy

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Abstract. This study assessed teachers' self-reported 21st-century skills, perceived digital competence, and digital self-efficacy and examined selected relationships among these variables in public elementary schools in the Tagoloan East and West Districts during School Year 2025–2026. Specifically, it examined the relationship between learning skills and digital competence and the relationship between literacy skills and digital self-efficacy. A quantitative descriptive-correlational design was employed involving 180 public elementary school teachers included through total enumeration. Data were collected using a 170-item researcher-modified questionnaire and analyzed using mean, standard deviation, and Pearson's product-moment correlation coefficient. The teachers reported very high levels of 21st-century skills and digital self-efficacy and perceived themselves as very competent in using digital technologies. Learning skills had strong to very strong positive relationships with the domains of perceived digital competence, with coefficients ranging from $r=.71$ to $r=.99$, all $p<.001$. Literacy skills also had strong to very strong positive relationships with the domains of digital self-efficacy, with coefficients ranging from $r=.71$ to $r=.88$, all $p<.001$. These findings indicate that higher self-reported learning skills were associated with higher perceived digital competence, while higher literacy skills were associated with higher digital self-efficacy. However, the findings should be interpreted cautiously because all variables were measured simultaneously through the same self-report instrument, which may have inflated the observed relationships. The results indicate statistical associations and do not establish causal relationships or demonstrate digital proficiency.

Keywords: 21st-century skills; Digital competence; Digital self-efficacy; Learning skills; Literacy skills.

The rapid advancement of technology has transformed the educational landscape, requiring teachers to develop competencies beyond traditional instructional practices. In the 21st century, educators are expected to possess not only content knowledge and pedagogical skills but also competencies such as communication, collaboration, critical thinking, creativity, digital literacy, adaptability, and technological proficiency (Fideli & Aliazas, 2022). These competencies are essential for designing meaningful learning experiences and preparing learners to thrive in increasingly digital and interconnected societies. As educational institutions continue to integrate digital technologies into instruction, teachers are also expected to use digital tools effectively for teaching, assessment, communication, and professional engagement.

In the Philippines, the growing emphasis on digital transformation in education has highlighted the importance of teachers' digital competence and digital self-efficacy. Digital competence refers to teachers' ability to use digital

technologies effectively, ethically, and pedagogically in educational settings (Cabero-Almenara et al., 2023). It includes competencies related to professional engagement, digital resources, teaching and learning, assessment, learner empowerment, and facilitation of learners' digital competence (Cid-Martínez et al., 2025). Meanwhile, digital self-efficacy pertains to teachers' confidence in their ability to utilize digital technologies, solve technological challenges, adapt to emerging platforms, and maintain online safety (Ulfert-Blank et al., 2022). Teachers with higher levels of digital self-efficacy are more likely to integrate technology effectively and demonstrate greater resilience in technology-enhanced learning environments (Maran et al., 2022).

Although 21st-century skills, digital competence, and digital self-efficacy are theoretically related, they represent different aspects of teachers' professional functioning. Twenty-first-century skills refer to broader cognitive, interpersonal, literacy, and adaptive practices that teachers may apply in digital and nondigital situations. These include communication, collaboration, critical thinking, creativity, literacy, adaptability, initiative, and problem-solving (Quiño & Corpuz, 2021; Ayunar et al., 2024). Digital competence, by comparison, refers to teachers' perceived ability to apply digital technologies effectively, ethically, and pedagogically in specific areas of educational practice, including professional engagement, digital resources, teaching, assessment, learner empowerment, and the development of learners' digital competence (Cabero-Almenara et al., 2023; Cid-Martínez et al., 2025). Digital self-efficacy refers specifically to teachers' confidence that they can perform technology-related tasks, address digital challenges, adjust to unfamiliar platforms, and maintain online safety (Ulfert-Blank et al., 2022).

Thus, 21st-century skills concern broad reported practices, digital competence concerns perceived capability in technology-supported professional and pedagogical activities, and digital self-efficacy concerns confidence in performing digital tasks. A teacher may, for example, report strong general communication skills but limited competence in using digital platforms for professional engagement. Similarly, a teacher may understand online-safety practices but have limited confidence in applying them during an actual cybersecurity problem. These distinctions provided the conceptual basis for treating the variables as related but theoretically separate.

Nevertheless, the boundaries among these constructs are not absolute. Communication may overlap with professional engagement, literacy skills with technical skills and online safety, adaptability with digital adaptability, and general learner-support practices with empowering or facilitating learners. Because these areas were measured through the same self-report questionnaire, some observed relationships may represent a shared perception of professional confidence or similarly worded indicators rather than completely distinct constructs. The study therefore treated the constructs as conceptually distinguishable but did not assume that their empirical distinctness had been fully established.

Existing literature suggests that 21st-century skills are closely associated with teachers' capacity to function in digitally mediated educational contexts. Communication and collaboration skills are positively related to teachers' engagement with learners and participation in professional learning communities. Critical thinking and creativity also relate to designing innovative, technology-integrated instructional strategies (Quiño & Corpuz, 2021). Similarly, digital literacy and life skills, such as adaptability, initiative, and problem-solving, are relevant to teachers' navigation of evolving educational technologies and instructional demands (Ayunar et al., 2024). Teachers with stronger digital competence also tend to report greater engagement in student-centered learning, digital assessment, and developing learners' digital literacy and creativity (Abella & Rosa, 2023).

Despite the growing body of literature on 21st-century skills and digital competence, most studies examine these variables in isolation rather than exploring their interrelationships. Furthermore, few studies have examined how teachers' 21st-century skills relate to both digital competence and digital self-efficacy, particularly in the Philippine public elementary school context. In Tagoloan East and West Districts, teachers frequently request Information and Communication Technology (ICT)-related training during Learning Action Cell sessions due to challenges associated with technology integration and digital instruction. However, these concerns are primarily based on anecdotal observations and informal discussions, as no formal empirical assessment has been conducted regarding teachers' levels of 21st-century skills, digital competence, and digital self-efficacy.

This gap highlights the need to examine whether higher self-reported 21st-century skills are associated with higher perceived digital competence and digital self-efficacy. Understanding these relationships may provide useful evidence for planning responsive professional development programs, technology-integration initiatives, and

educational digital-transformation efforts. Moreover, the findings may help inform teacher training programs, institutional policies, and capacity-building initiatives aligned with the Philippine Professional Standards for Teachers and contemporary demands in digital education.

Hence, this study aimed to assess the levels of self-reported 21st-century skills, perceived digital competence, and digital self-efficacy among public elementary school teachers in the Tagoloan East and West Districts during School Year 2025–2026. Specifically, the descriptive component examined the teachers' learning, literacy, and life skills; perceived digital competence; and digital self-efficacy. The correlational component examined the relationship between learning skills and digital competence and the relationship between literacy skills and digital self-efficacy. These selected relationships were examined to provide district-level evidence that may inform professional development and technology-integration initiatives.

Specifically, the study sought to answer the following questions: (1) What is the level of teachers' self-reported 21st-century skills in terms of communication, critical thinking, collaboration, creativity, literacy skills, and life skills? (2) What is the level of teachers' perceived digital competence in terms of professional engagement, digital resources, teaching and learning, assessment, empowering learners, facilitating learners' digital competence, and open education? (3) What is the level of teachers' digital self-efficacy in terms of technical skills, problem-solving, adaptability, and online safety? (4) Is there a significant relationship between teachers' learning skills and their perceived digital competence? (5) Is there a significant relationship between teachers' literacy skills and their digital self-efficacy?

Based on the objectives of the study, the following null hypotheses were tested at the .05 level of significance:

H₀₁: There is no significant relationship between teachers' learning skills and their perceived digital competence.

H₀₂: There is no significant relationship between teachers' literacy skills and their digital self-efficacy.

Methodology

Research Design

This study employed a quantitative descriptive-correlational research design. The descriptive component determined respondents' self-reported 21st-century skills, perceived digital competence, and digital self-efficacy. The correlational component examined two selected relationships: the relationship between learning skills and the domains of perceived digital competence and the relationship between literacy skills and the domains of digital self-efficacy. The design was appropriate because the study described the measured variables and investigated selected associations without manipulating the research environment or participants. According to Creswell et al. (2023), descriptive-correlational research is appropriate for identifying relationships and patterns among naturally occurring variables.

Participants and Sampling Technique

The study's respondents comprised 180 public elementary school teachers from the Tagoloan East and West Districts under the Division of Misamis Oriental during the School Year 2025–2026. Participating schools included Mohon Elementary School, Natumulan Elementary School, Sta. Ana Elementary School, Tagoloan Central School, Baluarte Elementary School, Gracia Elementary School, and Casinglot Elementary School.

The study used total enumeration, inviting all eligible public elementary school teachers from the seven identified schools to participate. This approach was appropriate because the defined population was manageable and allowed the researcher to obtain comprehensive information from the teachers within the participating schools. Thus, the study functioned as a local census of the eligible teaching population in the selected schools during School Year 2025–2026. However, total enumeration did not make the sample representative of teachers outside the selected schools and districts. The study did not use random selection from a broader provincial, regional, or national teacher population. Therefore, the coverage provided strong local representation of the defined population but did not establish broader representativeness across other Philippine educational contexts. The inclusion criteria required participants to be currently employed as public elementary school teachers at the selected schools during the study and actively involved in classroom instruction. The study excluded teachers on extended leave, non-teaching personnel, school administrators, and individuals not directly involved in instructional delivery to maintain focus on instructional and technology-integration practices among classroom teachers.

Research Instrument

The study used a structured, researcher-modified questionnaire to measure public elementary school teachers' self-reported 21st-century skills, digital competence, and digital self-efficacy. The researchers developed and modified the instrument using established theoretical frameworks, a previously published instrument, and researcher-developed indicators. Its wording was contextualized to reflect the experiences and instructional practices of public elementary school teachers in the Tagoloan East and West Districts. The questionnaire consisted of three major parts containing a total of 170 items. Part I contained 60 items measuring 21st-century skills, Part II contained 70 items measuring digital competence, and Part III contained 40 items measuring digital self-efficacy. Each domain consisted of 10 items. Table 1 presents the major variables, domains, number of items, source or adaptation basis, measurement focus, and a representative item from each subscale. The sample items are provided to improve transparency concerning how the study operationalized the constructs.

Table 1. *Structure, Sources, and Representative Items of the Research Instrument*

Variable	Domain	Items	Source or Adaptation Basis	Measurement Focus	Representative Sample Item
21st-Century Skills	Communication	10	Modified from Quiño and Corpuz (2021)	Classroom interaction and clear, structured communication	"I give clear, concise, and structured instructions to guide students in completing classroom tasks."
21st-Century Skills	Critical Thinking	10	Modified from Quiño and Corpuz (2021)	Analysis, evaluation, decision-making, and problem-solving	"[Insert one verbatim final item.]"
21st-Century Skills	Collaboration	10	Modified from Quiño and Corpuz (2021)	Teamwork, cooperative learning, and shared instructional responsibilities	"[Insert one verbatim final item.]"
21st-Century Skills	Creativity	10	Modified from Quiño and Corpuz (2021)	Innovative, flexible, and varied instructional practices	"[Insert one verbatim final item.]"
21st-Century Skills	Literacy Skills	10	Modified from Quiño and Corpuz (2021)	Information evaluation, digital literacy, and ethical technology use	"[Insert one verbatim final item.]"
21st-Century Skills	Life Skills	10	Modified from Quiño and Corpuz (2021)	Adaptability, initiative, leadership, resilience, and professional growth	"[Insert one verbatim final item.]"
Digital Competence	Professional Engagement	10	Adapted from DigCompEdu (Redecker, 2017)	Digital communication, collaboration, and professional learning	"[Insert one verbatim final item.]"
Digital Competence	Digital Resources	10	Adapted from DigCompEdu (Redecker, 2017)	Locating, creating, modifying, organizing, protecting, and sharing digital resources	"[Insert one verbatim final item.]"
Digital Competence	Teaching and Learning	10	Adapted from DigCompEdu (Redecker, 2017)	Technology-supported instruction, guidance, participation, and collaboration	"[Insert one verbatim final item.]"
Digital Competence	Assessment	10	Adapted from DigCompEdu (Redecker, 2017)	Digital assessment, learner monitoring, evidence analysis, and feedback	"[Insert one verbatim final item.]"
Digital Competence	Empowering Learners	10	Adapted from DigCompEdu (Redecker, 2017)	Accessibility, inclusion, differentiation, participation, and learner autonomy	"[Insert one verbatim final item.]"
Digital Competence	Facilitating Learners' Digital Competence	10	Adapted from DigCompEdu (Redecker, 2017)	Development of learners' responsible and meaningful use of technology	"[Insert one verbatim final item.]"

Digital Competence	Open Education	10	Researcher-developed extension informed by DigCompEdu principles and open educational practices	Accessing, evaluating, adapting, creating, and sharing open educational resources	"[Insert one verbatim final item.]"
Digital Self-Efficacy	Technical Skills	10	Researcher-made	Confidence in operating devices, software, platforms, and applications	"I know how to set up and run online meetings or classes using tools like Zoom or Google Meet."
Digital Self-Efficacy	Problem-Solving	10	Researcher-made	Confidence in troubleshooting and selecting digital solutions	"[Insert one verbatim final item.]"
Digital Self-Efficacy	Adaptability	10	Researcher-made	Confidence in learning and adjusting to emerging technologies	"[Insert one verbatim final item.]"
Digital Self-Efficacy	Online Safety	10	Researcher-made	Confidence in cybersecurity, data privacy, digital citizenship, and responsible online behavior	"[Insert one verbatim final item.]"
Total	17 domains	170			

The modification process involved reviewing each domain's theoretical definition and intended focus, comparing the original indicators with the context of public elementary school teaching, and revising items that were vague, broad, repetitive, technically complex, or not directly applicable to respondents. The changes primarily involved contextualizing terminology, improving sentence structure, adding familiar examples, and using observable action verbs. These modifications aimed to improve clarity and contextual relevance without changing the theoretical meaning of the original domains.

For the 21st-century skills section, we reviewed and reworded items from Quiño and Corpuz (2021) to describe practices applicable to public elementary school teachers. For the digital competence section, the DigCompEdu competence areas were operationalized as frequency-based statements describing teachers' professional and pedagogical use of digital technologies. For the digital self-efficacy section, the researcher wrote items as statements of confidence in performing specific technology-related tasks.

The researcher and expert validators derived the final wording through repeated review. The researcher revised, combined, reorganized, or removed statements identified as vague, repetitive, or inconsistent with their intended domains. Examples involving learning management systems, online meeting platforms, multimedia applications, online simulations, assistive technologies, and open educational resources were added when they improved an item's clarity and contextual relevance.

Teachers' 21st-Century Skills

Part I measured teachers' self-reported 21st-century skills using a modified version of the instrument developed by Quiño and Corpuz (2021). It consisted of 60 items distributed equally across six domains: communication, critical thinking, collaboration, creativity, literacy skills, and life skills. Each domain contained 10 items. The communication domain measured teachers' reported ability to promote classroom interaction and provide clear, structured instructions; critical thinking measured practices intended to develop learners' analytical reasoning, evaluation, decision-making, and problem-solving. Collaboration focused on teamwork, cooperative learning, peer interaction, and shared classroom responsibilities. Creativity examined the use of innovative, flexible, and varied instructional strategies. Literacy skills addressed digital literacy, *information evaluation*, *ethical technology use*, and responsible online behavior. Life skills covered adaptability, leadership, initiative, resilience, and professional growth in technology-integrated learning environments. The modifications primarily *clarified* and *contextualized* the statements without intentionally changing the constructs they measured. For example, the original communication item, "I give clear and concise instructions for classroom tasks," was revised as follows: "I give clear, concise, and structured instructions to guide students in completing classroom tasks." The revised statement describes the expected teaching practice more precisely and makes the behavior more observable.

Teachers' Digital Competence

Part II measured teachers' perceived digital competence using indicators adapted from the European Framework for the Digital Competence of Educators (DigCompEdu), developed by Redecker (2017). DigCompEdu organizes educators' digital competence into six areas: professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital competence. These six areas were retained because, taken together, they represent teachers' major professional and pedagogical responsibilities involving digital technologies.

The six DigCompEdu areas were considered relevant to public elementary school teachers in the Tagoloan East and West Districts because teachers use digital technologies for professional communication and learning, preparation and management of instructional resources, delivery of instruction, assessment and feedback, learner inclusion and participation, and the development of learners' responsible technology use. Retaining all six areas also allowed the instrument to represent digital competence as a multidimensional construct rather than limiting it to technical operation. The original framework was not reproduced verbatim. We operationalized its competence areas and indicators as frequency-based self-report statements describing practices applicable to public elementary school teachers. The adaptation simplified technical terminology, used teacher-friendly language, and contextualized the indicators with examples familiar to respondents. These examples included learning management systems, multimedia applications, online meeting platforms, digital assessment tools, online simulations, assistive technologies, and open educational resources. Each of the six DigCompEdu-based domains contained 10 items. Professional engagement measured teachers' reported use of digital technologies for professional communication, collaboration, reflective practice, and continuing professional learning. Digital resources measured practices involving the location, evaluation, creation, modification, organization, protection, and sharing of digital instructional materials. Teaching and learning examined technology-supported instruction, guidance, collaboration, and learner participation.

Assessment measured teachers' reported use of digital tools to evaluate learning, monitor progress, analyze evidence, and provide feedback. Empowering learners examined the use of digital technologies to support accessibility, inclusion, differentiation, learner autonomy, and active participation. Facilitating learners' digital competence measured teachers' reported guidance of learners in accessing and evaluating information, communicating responsibly, creating digital content, practicing online safety, and solving technology-related problems. The validators reviewed the adapted statements for clarity, contextual relevance, and alignment with the intended DigCompEdu areas. The validators revised, combined, or reorganized items that appeared vague, repetitive, technically complex, or inconsistent with their assigned areas. These procedures provided evidence of content relevance but did not empirically validate the modified factor structure.

In addition to the six original DigCompEdu areas, the study included open education as a seventh, researcher-modified domain containing 10 items. Open education is not a separate competence area in the original DigCompEdu framework. Therefore, it was not presented as an established DigCompEdu domain. The domain was added to measure teachers' reported practices in locating, evaluating, accessing, using, adapting, creating, and sharing open educational resources. It was considered contextually relevant because openly accessible and adaptable instructional materials may support public elementary teachers who work with varying levels of technological access and instructional resources.

The researcher developed the open education indicators, informed by general DigCompEdu principles on digital resources, responsible sharing, collaboration, and ethical technology use, along with open educational practices. They were not directly adopted from a separate established open education scale. Consequently, the domain should be interpreted as a researcher-developed extension of the digital competence section rather than an original DigCompEdu component. The open education items underwent the same expert review and pilot-testing procedures as the other sections. However, expert review and Cronbach's alpha established only content relevance and internal consistency. They did not confirm that open education represented a distinct empirical construct. Further factor-analytic and construct-validation evidence is therefore required.

Teachers' Digital Self-Efficacy

Part III used a researcher-made questionnaire to measure teachers' confidence in performing technology-related tasks. It consisted of 40 items distributed equally across technical skills, problem-solving, adaptability, and online safety. Each domain contained 10 items.

Technical skills measured teachers' confidence in operating digital devices, learning management systems, multimedia applications, productivity tools, and online meeting platforms. Problem-solving assessed their confidence in troubleshooting common technical difficulties and applying digital tools to instructional challenges. Adaptability measured confidence in learning and adjusting to emerging technologies, unfamiliar digital platforms, and changing teaching modalities. Online safety examined confidence in applying cybersecurity practices, protecting data privacy, behaving responsibly online, and promoting digital citizenship.

We rewrote technical statements using terms familiar to teachers. For example, an item measuring confidence in managing online meetings was presented as follows: "I know how to set up and run online meetings or classes using tools like Zoom or Google Meet." Including familiar examples made the task more specific and understandable without intentionally changing the competence being measured.

Table 2. *Conceptual Boundaries Among Potentially Overlapping Domains*

Related Domains	Conceptual Distinction
Communication and Professional Engagement	Communication concerns general classroom and professional interaction, while professional engagement concerns the use of digital technologies for communication, collaboration, and professional learning.
Literacy Skills and Technical Skills	Literacy skills concern accessing, evaluating, interpreting, and responsibly using information and media, while technical skills concern confidence in operating digital devices, software, platforms, and applications.
Literacy Skills and Online Safety	Literacy skills concern the critical and ethical evaluation of digital information, while online safety concerns confidence in applying cybersecurity, data-privacy, and responsible online practices.
Life-Skills Adaptability and Digital Self-Efficacy Adaptability	Life-skills adaptability concerns general flexibility and resilience in responding to professional change, while digital adaptability concerns confidence in learning and adjusting to unfamiliar digital technologies and platforms.
Communication and Empowering Learners	Communication concerns teachers' general interaction and delivery of instructions, while empowering learners concerns the reported use of digital technologies to support accessibility, inclusion, differentiation, participation, and learner autonomy.
Literacy Skills and Facilitating Learners' Digital Competence	Literacy skills concern teachers' own reported information and media practices, while facilitating learners' digital competence concerns teachers' reported guidance of learners in developing responsible and meaningful technology use.
Digital Competence and Digital Self-Efficacy	Digital competence concerns teachers' perceived capability and reported practice in technology-supported teaching. In contrast, digital self-efficacy concerns their confidence that they can perform specific digital tasks or respond to technological challenges.

The domains were assigned to separate subscales according to their conceptual focus, target of action, and type of judgment. Items measuring general practices were assigned to 21st-century skills; items measuring technology-supported professional or pedagogical practices were assigned to digital competence; and items measuring confidence in performing digital tasks were assigned to digital self-efficacy. During expert review, the experts combined, revised, or reorganized similarly worded items to improve alignment with their intended domains. However, because the study did not conduct a statistical test of discriminant validity, it could not conclusively determine whether the subscales were empirically distinct.

Instrument Modification and Content Validation

The questionnaire underwent expert review to assess the clarity, organization, relevance, and consistency of its items with the study objectives. Modifications covered the introductory letter, questionnaire instructions, item wording, examples, response scale, formatting, and domain organization. The letter to the respondents was revised to include a formal greeting, a clearer explanation of the study's purpose, a brief introduction to the DigCompEdu framework, and statements concerning voluntary participation and confidentiality. These modifications gave respondents enough information about the study before answering the questionnaire. We rewrote or reorganized several items based on the validators' observations. Most revisions addressed statements that were vague, overly broad, repetitive, or inconsistent. We used observable action verbs such as "I encourage," "I guide," "I create," and "I demonstrate" to make the indicators more behaviorally specific.

The digital competence items were also contextualized by including examples from actual teaching situations, such as learning management systems, open educational resources, online simulations, multimedia applications, and assistive technologies. Items with similar meanings were combined or reorganized to reduce unnecessary repetition and improve alignment between each indicator and its intended domain. The technical statements in the digital self-efficacy section were rewritten using language familiar to teachers. The formatting of the complete questionnaire was also standardized for punctuation, numbering, phrasing, and presentation. Following the validators' recommendation, the same four-point response scale was applied to all three sections.

These revisions provided evidence of the instrument's face and content relevance. They also strengthened its contextual alignment with DigCompEdu, the Philippine Professional Standards for Teachers, and the technology-related responsibilities of Filipino public elementary school teachers. These revisions provided evidence of the instrument's face and content relevance. They strengthened its contextual alignment with DigCompEdu, the Philippine Professional Standards for Teachers, and the technology-related responsibilities of Filipino public elementary school teachers. The validators also reviewed potentially similar items and recommended combining, revising, or reorganizing statements that appeared vague, repetitive, or inconsistent with their intended domains. However, expert review established only the conceptual relevance and clarity of the items. It did not provide empirical evidence that the 17 subscales represented distinct latent constructs. The study did not conduct exploratory factor analysis, confirmatory factor analysis, or discriminant-validity testing. Therefore, the possibility that some domains measured overlapping aspects of general professional confidence or shared response tendencies could not be ruled out.

Pilot Testing and Internal Consistency

The revised questionnaire was pilot-tested with 30 respondents who were not included in the main study. We calculated Cronbach's alpha separately for each subscale to assess item-level internal consistency. The six 21st-century skills domains obtained coefficients ranging from $\alpha=.965$ to $\alpha=.967$. Communication, critical thinking, and life skills each obtained $\alpha=.965$. Creativity and literacy skills each obtained $\alpha=.966$, while collaboration obtained the highest coefficient at $\alpha=.967$. The seven digital competence domains obtained coefficients ranging from $\alpha=.964$ to $\alpha=.966$. Teaching and learning and facilitating learners' digital competence each obtained $\alpha=.965$. The four digital self-efficacy domains obtained coefficients ranging from $\alpha=.964$ to $\alpha=.965$. The high Cronbach's alpha coefficients were interpreted as evidence of internal consistency within the subscales. They were not interpreted as evidence of construct validity or discriminant validity. Coefficients above .95 may indicate that some items have highly similar or repetitive content. The coefficients may also partly reflect narrow item wording, common phrasing, or the number of items included in the scales.

Moreover, Cronbach's alpha does not establish that communication, literacy skills, digital competence, adaptability, online safety, and digital self-efficacy are empirically distinct constructs. Expert review established the conceptual relevance and clarity of the items but did not provide factor-analytic evidence supporting the proposed subscale structure. The study did not conduct item-reduction procedures, exploratory factor analysis, confirmatory factor analysis, or discriminant-validity testing. Therefore, interpret the reliability coefficients cautiously as indicators of internal consistency rather than confirmation that every item was necessary or that all subscales measured distinct constructs. Future validation studies should examine inter-item correlations, corrected item-total correlations, alpha if an item is deleted, factor loadings, cross-loadings, and discriminant validity. These analyses may support removing or revising repetitive items and developing shorter, more clearly differentiated subscales. Due to the length of the 170-item questionnaire, the complete instrument is not reproduced in the main text. The instrument map shows the distribution, source, measurement focus, and a representative item for each subscale. The complete validated questionnaire may be provided as supplementary material, subject to applicable permissions concerning the adapted items.

Data Gathering Procedure

Before data collection, the researcher secured approval from the appropriate school authorities and obtained permission from the concerned offices within the Division of Misamis Oriental. After approval, the researcher distributed a formal letter requesting permission to conduct the study to the school heads of the participating schools. Upon approval, the researcher personally administered the questionnaires to the respondents face-to-face. The researcher clearly explained the study's purpose, instructions for completing the questionnaire, and ethical considerations to participants before administering the survey. Respondents were given sufficient time to

answer the questionnaire honestly and completely. Questionnaires were retrieved immediately after completion to ensure a high retrieval rate and prevent data loss. The collected responses were checked, organized, tabulated, and prepared for statistical analysis. Throughout the data gathering process, confidentiality and voluntary participation were strictly observed.

Data Analysis Procedure

All items were rated using a four-point Likert-type frequency scale: 4 – At all times, 3 – Most of the time, 2 – Sometimes, and 1 – Never. The same response scale was applied across the three sections to maintain consistency in questionnaire administration. The mean score for each domain was calculated by averaging the responses to its 10 assigned items. The overall 21st-century skills score was obtained by averaging all 60 items, while the overall digital competence and digital self-efficacy scores were obtained by averaging their 70 and 40 assigned items, respectively. The interpretive intervals were established by dividing the possible score range by the four response categories: $(4-1)/4 = .75$. The resulting intervals were used to describe respondents' self-reported practices, perceived competence, and confidence. Means and standard deviations described respondents' self-reported 21st-century skills, perceived digital competence, and digital self-efficacy. The descriptive results were interpreted using the questionnaire's established scoring ranges.

Pearson's product-moment correlation coefficient was employed to examine two selected relationships. The first analysis examined the relationship between teachers' learning-skills composite score and each domain-level composite score of perceived digital competence. We calculated the learning-skills composite score for each respondent by averaging the 40 items covering communication, critical thinking, collaboration, and creativity. We calculated each digital competence domain score by averaging the 10 items assigned to that domain.

The second analysis examined the relationship between teachers' literacy-skills composite score and each domain-level composite score of digital self-efficacy. The literacy-skills score was calculated for each respondent by averaging its 10 assigned items. We calculated each digital self-efficacy domain score by averaging the 10 items assigned to that domain. Overall digital self-efficacy was calculated by averaging all 40 items across technical skills, problem-solving, adaptability, and online safety.

We calculated all correlations using respondent-level composite scores from the 180 participants. We did not use the descriptive means reported in Tables 1–3 as observations in the correlation analyses. We conducted two-tailed tests and set statistical significance at $\alpha=.05$. We checked the correlation coefficients, sample sizes, and probability values against the original statistical software output. We reported probability values smaller than .001 as $p<.001$ rather than $p=.000$. Because the study employed a correlational design, we interpreted the results as statistical associations, not evidence of causal influence.

Ethical Considerations

The study strictly observed ethical principles throughout. Before data collection, the researchers obtained permission to conduct the research from the appropriate educational authorities and school administrators. Participation in the study was entirely voluntary, and informed consent was secured from all respondents before administering the questionnaire. Respondents were informed about the purpose of the study, the nature of their participation, and their right to withdraw at any time without penalty. The researcher maintained confidentiality and anonymity by ensuring respondents' identities were not disclosed at any point in the study. The information gathered was used solely for academic and research purposes. Furthermore, all collected data were stored securely and handled with utmost confidentiality. The researcher ensured that the study complied with ethical standards concerning respect for persons, beneficence, and data privacy throughout the entire research process.

Results and Discussion

The descriptive results represent the respondents' self-reported practices, perceived digital competence, and confidence in performing digital tasks. They should not be interpreted as direct measurements of actual classroom performance or demonstrated digital proficiency. Because the questionnaire used a four-point scale without a neutral option and all domain means fell in the highest category, the findings were interpreted cautiously, considering possible ceiling effects, social desirability, acquiescence bias, and positive self-appraisal.

Level of Teachers' 21st-Century Skills

Table 3 presents the respondents' self-reported 21st-century skills across communication, critical thinking, collaboration, creativity, literacy skills, and life skills.

Table 3. *Level of Teachers' 21st-Century Skills*

21st-Century Skills	M	SD	Interpretation
Communication	3.62	0.41	Very High
Critical Thinking	3.55	0.45	Very High
Collaboration	3.68	0.39	Very High
Creativity	3.49	0.47	Very High
Literacy Skills	3.58	0.43	Very High
Life Skills	3.61	0.40	Very High
Overall	3.59	0.43	Very High

The respondents reported a very high overall level of 21st-century skills ($M=3.59$, $SD=0.43$). Among the domains, collaboration obtained the highest mean ($M=3.68$, $SD=0.39$), followed by communication ($M=3.62$, $SD=0.41$), life skills ($M=3.61$, $SD=0.40$), literacy skills ($M=3.58$, $SD=0.43$), and critical thinking ($M=3.55$, $SD=0.45$). Creativity obtained the lowest mean ($M=3.49$, $SD=0.47$), although it remained within the very high interpretive category. These findings reflect the respondents' positive perceptions of how frequently they apply communication, collaboration, critical thinking, creativity, literacy, and life skills in their professional practices. Fan et al. (2023) emphasized that learning skills such as communication, collaboration, critical thinking, and creativity are essential competencies for modern educators. Similarly, Almulla (2023) noted that these skills support teachers' adaptability and instructional innovation in rapidly changing educational contexts.

The very high rating for communication suggests that respondents perceived themselves as frequently providing clear instructions, facilitating classroom interaction, expressing ideas, providing feedback, and communicating with learners and colleagues in traditional and digital settings. Effective communication remains important because teachers are expected to sustain discussions and collaborative interactions through various classroom and digital platforms. This finding is consistent with Novia et al. (2024), who highlighted the importance of communication skills in classroom dynamics, learner engagement, and instructional effectiveness. However, the result represents teachers' perceptions of their communication practices and does not independently demonstrate the quality or effectiveness of their classroom communication.

Critical thinking also received a very high self-reported rating. This suggests that respondents perceived themselves as frequently analyzing information, evaluating instructional resources, addressing instructional problems, and making pedagogical decisions. In digitally integrated environments, critical thinking is particularly relevant to evaluating the credibility of information, selecting appropriate technologies, and designing inquiry-based and problem-solving activities. Abella and Rosa (2023) emphasized that critical thinking supports teachers' meaningful use of digital technologies in inquiry-based and problem-solving learning approaches. Nevertheless, the present rating should be interpreted as a report of perceived practice rather than direct evidence that respondents demonstrated these abilities under observed classroom conditions.

Collaboration emerged as the highest-rated domain, suggesting that respondents perceived themselves as frequently participating in teamwork, peer learning, shared planning, and other collaborative professional practices. This positive perception may reflect their participation in Learning Action Cell sessions, collaborative lesson preparation, peer mentoring, and other school-based activities. Collaboration is relevant in technology-integrated environments because teachers may rely on shared resources, collective problem-solving, and professional support when adapting to digital innovations. Fideli and Aliasas (2022) noted that collaborative competencies support teachers' integration of digital tools and the development of cooperative learning experiences. However, the high self-rating does not, on its own, establish the quality, consistency, or outcomes of the reported collaborative practices.

Although creativity obtained the lowest mean, it remained within the very high interpretive category. This indicates that respondents generally perceived themselves as frequently using innovative, flexible, and varied instructional approaches. Its comparatively lower mean may suggest that creativity requires further institutional support, professional development opportunities, technological resources, and flexible instructional environments. Eslit (2023) explained that rigid curricular demands, limited technological resources, and

insufficient professional development may constrain teachers' creativity. Therefore, although respondents reported positive perceptions of their creative practices, additional evidence would be needed to determine how these practices are demonstrated in actual instructional planning and classroom delivery.

The very high rating for literacy skills indicates that respondents viewed themselves as frequently accessing, evaluating, interpreting, and responsibly using digital and informational resources. These competencies matter because teachers are expected to navigate large amounts of digital information, evaluate source credibility, and use media and technology ethically in instruction. Digal et al. (2024) emphasized that literacy skills provide an important foundation for digital competence and technology integration in education. However, the present findings reflect respondents' perceptions and do not directly verify their ability to evaluate sources or use digital information effectively in performance-based situations.

The life-skills rating indicates positive self-perceptions concerning adaptability, initiative, flexibility, resilience, leadership, responsibility, and professional growth. These skills matter because teachers continually encounter changing instructional technologies, curriculum reforms, and diverse learner needs. Ayunar et al. (2024) highlighted that teachers with strong life skills tend to be more resilient and adaptable when responding to digital transformation and instructional disruptions. In the present study, however, the high rating indicates that respondents perceived themselves as frequently demonstrating these qualities; it should not be treated as independent evidence that they consistently demonstrate adaptability and resilience in actual educational situations.

Although all domains were classified as very high, their means fell within a relatively narrow range of 3.49 to 3.68. This clustering indicates limited differentiation among the measured domains and suggests a possible ceiling effect. The four-point scale may not have adequately distinguished respondents with moderately high skills from those with exceptionally high skills. The lack of a neutral option may also have encouraged responses at the upper end of the scale. Moreover, social desirability, acquiescence bias, and self-enhancement may have influenced the responses because the questionnaire assessed behaviors and abilities that are professionally valued among teachers.

Therefore, the overall mean of 3.59 should be interpreted as a very high level of self-reported frequency rather than proof that the respondents demonstrated an equally high level of 21st-century skills in practice. The findings suggest that teachers held positive perceptions of their communication, collaboration, critical-thinking, creativity, literacy, and life skills. However, they should not be equated with demonstrated readiness or actual classroom proficiency. Classroom observations, performance-based assessments, peer or supervisor ratings, and teaching artifacts would be needed to determine whether these positive self-ratings correspond with demonstrated competence in technology-integrated and learner-centered educational environments.

Level of Teachers' Digital Competence

Table 4 presents the respondents' perceived digital competence across six domains adapted from the DigCompEdu framework and one researcher-added domain on open education.

Table 4. Teachers' Perceived Digital Competence Across DigCompEdu-Adapted and Researcher-Added Domains

Digital Competence Domain	M	SD	Interpretation
Professional Engagement	3.54	0.44	Very Competent
Digital Resources	3.51	0.46	Very Competent
Teaching and Learning	3.57	0.42	Very Competent
Assessment	3.49	0.45	Very Competent
Empowering Learners	3.60	0.40	Very Competent
Facilitating Learners' Digital Competence	3.55	0.43	Very Competent
Open Education	3.46	0.48	Very Competent
Overall	3.53	0.44	Very Competent

Note. Professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learners' digital competence were adapted from DigCompEdu (Redecker, 2017). Open education was included as a researcher-developed extension and is not one of the six original DigCompEdu competence areas. All results represent respondents' perceived competence based on self-report.

The respondents perceived themselves as very competent across all measured digital competence domains, with an overall mean of 3.53 (SD=0.44). Empowering learners obtained the highest mean (M=3.60, SD=0.40), followed by teaching and learning (M=3.57, SD=0.42), facilitating learners' digital competence (M=3.55, SD=0.43), professional engagement (M=3.54, SD=0.44), digital resources (M=3.51, SD=0.46), and assessment (M=3.49,

SD=0.45). Open education obtained the lowest mean ($M=3.46$, $SD=0.48$), although it remained within the very competent category. These results broadly align with the multidimensional view of digital competence in the DigCompEdu framework, which extends beyond technical proficiency to include professional engagement, digital resources, pedagogical integration, assessment, learner empowerment, and the development of learners' digital competence.

The professional engagement rating indicates that respondents perceived themselves as frequently using digital platforms for communication, collaboration, and professional learning. These positive perceptions may be associated with respondents' participation in Learning Action Cell sessions, webinars, online training, and collaborative digital communities. Disonglo and Limpot (2023) emphasized that participation in professional digital networks supports teachers' integration of technology into instructional practices. Similarly, Quast et al. (2023) highlighted that collaborative professional engagement promotes practice sharing and supports educators' digital competence. However, the present result reflects teachers' perceptions of their professional digital engagement and does not independently establish the frequency, quality, or effectiveness of these practices.

The digital resources domain also received a very competent rating, suggesting that respondents perceived themselves as frequently locating, creating, modifying, organizing, and using digital instructional materials. Their reported use of multimedia presentations, online learning materials, and interactive resources may reflect familiarity with technology-supported instruction. Ballano et al. (2022) found that exposure to technology is related to teachers' ability to select and meaningfully use digital resources. Nevertheless, the questionnaire did not directly assess the quality, appropriateness, or instructional effectiveness of the digital materials respondents created or selected.

The teaching and learning domain received the second-highest mean. This indicates that respondents perceived themselves as frequently integrating digital technologies into instructional delivery and learner engagement. They may have used technology not only for presentations but also for interactive and learner-centered activities. Abella and Rosa (2023) noted that digitally competent teachers are better positioned to design technology-supported learning experiences that promote learner motivation and participation. In the present study, however, this interpretation is based on self-reported practices and does not independently verify how consistently or effectively digital technologies were integrated into actual classroom instruction.

Assessment received one of the lower means, although it remained within the very competent category. This result indicates that respondents generally perceived themselves as using digital tools to evaluate learner performance, monitor progress, and provide feedback. Its comparatively lower mean may suggest less confidence or less frequent engagement with digital assessment platforms and data-informed instructional practices. Del Mundo (2022) emphasized that digital assessment requires both technical and pedagogical competence to support meaningful and accurate evaluation of student learning. Therefore, continuous professional development in digital assessment, feedback tools, and the instructional use of learner data may still be beneficial.

Empowering learners emerged as the highest-rated domain, suggesting that respondents perceived themselves as frequently using digital technologies to support learner participation, accessibility, inclusion, differentiation, independence, and autonomy. Quiño and Corpuz (2021) emphasized the importance of teachers' digital competence in learner motivation, engagement, and digital self-efficacy. Nevertheless, the present rating reflects teachers' perceptions of their learner-empowerment practices. It does not independently demonstrate that their use of technology produced greater learner autonomy, inclusion, participation, or confidence.

The very competent rating for facilitating learners' digital competence indicates that respondents perceived themselves as frequently guiding learners in developing digital literacy, critical thinking, collaboration, and responsible technology use. Tohani and Aulia (2022) explained that facilitating learners in digital environments requires teachers to integrate technology meaningfully while guiding students toward ethical and responsible digital practices. The results suggest that respondents recognized their role in supporting learners' digital development, but observations, student outputs, or performance-based evidence would be needed to verify how they implemented these reported practices.

Open education obtained the lowest mean but remained within the very competent category. This suggests that respondents generally perceived themselves as familiar with open educational resources and collaborative digital

learning practices. However, the comparatively lower rating may indicate that respondents used, adapted, created, and shared open educational resources less frequently than they engaged in the practices measured in other domains. Possible constraints may include internet accessibility, limited familiarity with open educational platforms, copyright and licensing concerns, and insufficient institutional support. Quiño and Corpuz (2021) highlighted that open educational practices require digital competence, institutional encouragement, and access to collaborative digital communities. Strengthening teachers' knowledge of open licensing and their ability to evaluate, adapt, and share open educational resources may therefore support more meaningful engagement with open education.

Although all domains were classified as very competent, their means were concentrated within the narrow range of 3.46 to 3.60. This clustering suggests limited differentiation among the measured domains and a possible ceiling effect. The four-point scale may not have adequately distinguished respondents with moderately high perceived competence from those with exceptionally high perceived competence. The absence of a neutral response option may also have encouraged positive selections. Furthermore, because digital competence is a professionally desirable characteristic, social desirability, acquiescence bias, and self-enhancement may have influenced respondents to rate themselves according to expected teaching practices.

Consequently, the overall mean of 3.53 should be interpreted as very high perceived digital competence, not as evidence that the respondents demonstrated an equivalent level of competence in actual instructional settings. The results suggest that teachers held positive perceptions of their use of digital technologies for professional engagement, resource preparation, instruction, assessment, learner empowerment, and open education. However, the questionnaire did not directly assess their ability to complete authentic digital tasks, design and implement technology-integrated lessons, conduct digital assessments, or address actual technical challenges.

Independent evidence—such as classroom observations, digital performance tasks, technology-integrated lesson plans, learning management system records, learner outputs, and peer or supervisor ratings—would be necessary to determine whether the high perceived competence corresponds with demonstrated digital performance. Thus, the findings may inform professional-development planning but should not be equated with objectively verified digital readiness, instructional effectiveness, or proficiency.

Level of Teachers' Digital Self-Efficacy

Table 5 presents respondents' levels of digital self-efficacy across technical skills, problem-solving, adaptability, and online safety.

Table 5. *Level of Teachers' Digital Self-Efficacy*

Digital Self-Efficacy Domains	<i>M</i>	<i>SD</i>	Interpretation
Technical Skills	3.56	0.43	Very High
Problem-Solving	3.48	0.46	Very High
Adaptability	3.60	0.41	Very High
Online Safety	3.52	0.44	Very High
Overall	3.54	0.44	Very High

Respondents reported a very high overall level of digital self-efficacy ($M = 3.54$, $SD = 0.44$). Adaptability obtained the highest mean ($M=3.60$, $SD=0.41$), followed by technical skills ($M=3.56$, $SD=0.43$), online safety ($M=3.52$, $SD=0.44$), and problem-solving ($M=3.48$, $SD=0.46$). All four domains were classified as very high, indicating that respondents generally held positive beliefs about their ability to perform technology-related tasks in instructional and professional contexts. Digital self-efficacy is important because teachers who believe in their technological capabilities may be more willing to adopt innovative strategies, integrate technology into instruction, and persist when they encounter technical difficulties. Ulfert-Blank et al. (2022) emphasized that teachers' confidence in using digital technologies is related to their willingness to participate in technology-enhanced teaching practices.

The very high rating for technical skills suggests respondents felt confident operating digital devices, using productivity software and multimedia applications, managing learning platforms, and facilitating online meetings. This confidence may reflect respondents' exposure to online learning environments, webinars, virtual meetings, and technology-supported instruction. Ballano et al. (2022) noted that teachers with stronger technical skills are better positioned to implement interactive and technology-integrated instructional practices. Nevertheless, the present study measured confidence in performing these tasks and did not directly assess how

accurately, independently, or effectively the respondents performed them under authentic instructional conditions.

Problem-solving obtained the lowest mean, although it remained within the very high interpretive category. This suggests that respondents generally felt confident in addressing technological challenges but may have been comparatively less confident in troubleshooting technical issues, resolving software problems, or identifying appropriate digital solutions during instruction. Digital problem-solving requires technical knowledge, decision-making, persistence, and resilience, particularly when unexpected technological disruptions occur. Maran et al. (2022) emphasized that teachers with stronger problem-solving self-efficacy are more likely to experiment with digital tools and persist despite technological difficulties. The comparatively lower mean may indicate a need for hands-on troubleshooting activities, accessible technical assistance, and advanced digital problem-solving training.

Adaptability emerged as the highest-rated domain, indicating that respondents expressed strong confidence in their ability to adjust to emerging technologies, unfamiliar digital platforms, and changing instructional modalities. This positive self-perception may reflect their experiences in shifting among face-to-face, online, blended, and technology-supported instruction. Ayunar et al. (2024) highlighted that adaptable teachers tend to be more open to continuous learning and better able to navigate evolving educational demands. Similarly, Del Mundo (2022) noted that adaptability became particularly important during periods of educational disruption, when teachers had to shift instructional modalities rapidly. However, the high rating represents perceived adaptability and does not independently establish that respondents consistently maintained instructional effectiveness during technological or instructional changes.

Online safety also received a very high rating, suggesting that respondents were confident in applying cybersecurity practices, protecting data privacy, promoting digital citizenship, and behaving responsibly online. Online safety is particularly important in digitally integrated settings because teachers are expected to protect their own digital information and guide learners in the safe and ethical use of technology. Letigio and Balijon (2022) emphasized that online safety awareness is associated with responsible digital engagement and the creation of secure digital learning environments. Although the results indicate strong confidence, respondents' actual knowledge and application of online safety practices would require verification through scenario-based assessments, observed practices, or performance tasks.

The consistently very high ratings across all domains indicate that respondents generally believed they could function effectively in digitally integrated educational environments. Chonsalasin and Khampirat (2022) found that teachers with high digital self-efficacy exhibit greater confidence, adaptability, and willingness to engage in technology-supported instruction. In the present study, the respondents' confidence may have developed through continuous exposure to educational technologies and increasing institutional emphasis on technology integration. However, self-reported confidence should not automatically be equated with actual digital readiness, instructional effectiveness, or demonstrated proficiency.

Digital self-efficacy refers to confidence in performing digital tasks rather than demonstrated ability to complete them successfully. Therefore, the high ratings indicate that respondents generally believed they could manage technology-related tasks. However, they do not establish that they could perform these tasks at an equivalent level under authentic or observed conditions. The domain means were also tightly clustered between 3.48 and 3.60, indicating limited response spread and a possible ceiling effect. The four-point scale may not have adequately distinguished respondents with moderately high digital self-efficacy from those with exceptionally high digital self-efficacy.

The absence of a neutral response option may have encouraged selections at the positive end of the scale. Moreover, self-enhancement, social desirability, and acquiescence bias may have influenced the responses because confidence in technology use is considered a desirable professional characteristic. Respondents may have selected favorable answers that reflected expected professional behavior rather than their actual capacity to perform the stated tasks.

Accordingly, the overall mean of 3.54 should be interpreted as a very high level of self-reported confidence, not as direct evidence of digital readiness or proficiency. The results suggest that respondents felt confident in their

technical skills, digital problem-solving, adaptability, and online safety. Nevertheless, performance-based digital tasks, observed troubleshooting activities, scenario-based assessments, interviews, digital teaching artifacts, and peer or supervisor ratings would provide stronger evidence of whether their reported confidence corresponds with demonstrated performance.

The comparatively lower rating for problem-solving provides a practical basis for continuous professional development focused on troubleshooting, technical support, and authentic digital problem-solving experiences. Such initiatives may further support teachers' confidence when responding to technological difficulties. However, improvements in instructional innovation, digital readiness, and classroom performance should be determined using direct or performance-based assessments rather than self-report measures alone.

The overall means for 21st-century skills ($M=3.59$), perceived digital competence ($M=3.53$), and digital self-efficacy ($M=3.54$) fell within the highest interpretive category. The limited variation among these overall means and the clustering of the domain means near the upper boundary of the four-point scale suggest a possible ceiling effect. This may have reduced the instrument's ability to differentiate among respondents with varying levels of skills, perceived competence, and confidence.

The uniformly high scores may also reflect social desirability, acquiescence bias, and self-enhancement. Respondents may have selected positive answers because the questionnaire assessed abilities and practices expected of contemporary teachers. Additionally, using positively worded self-report statements and a scale without a neutral option may have encouraged responses at the upper end of the scale. The descriptive findings should therefore be understood as positive self-perceptions rather than objective evidence of readiness or proficiency.

Relationship Between Learning Skills and Digital Competence

Table 6 presents the relationship between the respondents' learning skills and perceived digital competence.

Table 6. *Test of Relationship Between Learning Skills and Digital Competence*

Digital Competence Domain	n	r	p-value	Interpretation	Decision on H_{01}
Professional Engagement	180	.98	< .001	Very strong positive relationship	Reject
Digital Resources	180	.76	< .001	Strong positive relationship	Reject
Teaching and Learning	180	.97	< .001	Very strong positive relationship	Reject
Assessment	180	.71	< .001	Strong positive relationship	Reject
Empowering Learners	180	.99	< .001	Very strong positive relationship	Reject
Facilitating Learners	180	.76	< .001	Strong positive relationship	Reject
Open Education	180	.91	< .001	Very strong positive relationship	Reject

Note. Pearson's product-moment correlation was calculated using the respondent-level learning-skills composite score and the respondent-level composite score for each digital competence domain ($N=180$). The learning-skills composite represented the average of the 40 items measuring communication, critical thinking, collaboration, and creativity. Each digital competence domain composite represented the average of its 10 assigned items. Two-tailed significance was set at $\alpha=.05$. Values smaller than .001 were reported as $p<.001$ rather than $p=.000$.

The coefficients and two-tailed probability values presented in Table 4 were verified against the original statistical software output. The analysis used the composite scores of the 180 individual respondents and did not correlate the seven digital competence means presented in the descriptive results. The findings are broadly consistent with the multidimensional view of educator digital competence presented in DigCompEdu. However, interpret the open education result separately because the researcher added this domain, and it is not one of the framework's six original competence areas.

The results showed statistically significant positive relationships between learning skills and all domains of perceived digital competence. The correlation coefficients ranged from $r=.71$ to $r=.99$, with all relationships statistically significant at $p<.001$. These results indicate that teachers who reported stronger communication, collaboration, critical-thinking, and creativity skills also tended to perceive themselves as more competent in using digital technologies for professional, instructional, assessment, and learner-support activities.

Learning skills had very strong positive relationships with professional engagement ($r=.98$, $p<.001$), teaching and learning ($r=.97$, $p<.001$), empowering learners ($r=.99$, $p<.001$), and open education ($r=.91$, $p<.001$). Strong positive relationships were also found with digital resources ($r=.76$, $p<.001$), assessment ($r=.71$, $p<.001$), and facilitating learners' digital competence ($r=.76$, $p<.001$). Empowering learners had the strongest relationship with learning

skills, while assessment had the weakest relationship. Nevertheless, all observed relationships were strong or very strong.

The exceptionally high relationships may partly reflect conceptual proximity among the measured domains. For example, communication and collaboration were components of learning skills, while professional engagement included digitally mediated communication and collaboration. Similarly, creativity and critical thinking may also be involved in teaching and learning, digital-resource selection, assessment, and learner empowerment. Consequently, the correlations may reflect both theoretically meaningful relationships and shared behavioral content across the subscales.

Although the questionnaire assigned these indicators to different domains based on their conceptual focus, the study did not conduct a discriminant-validity analysis to determine whether respondents distinguished among them consistently. Therefore, coefficients approaching $r=1.00$ should not be interpreted as definitive evidence of an almost perfect substantive relationship. They may also indicate that the measures captured a broader shared perception of professional and digital capability.

The very strong relationship between learning skills and professional engagement suggests that teachers who reported stronger communication, collaboration, critical-thinking, and creativity skills also tended to report greater engagement in professional digital practices. These practices may include participation in webinars, online professional communities, collaborative digital initiatives, and technology-supported professional learning. Quast et al. (2023) emphasized that collaborative digital engagement supports teachers' professional growth and digital instructional practices. However, the present relationship reflects an association between self-reported measures and does not establish that learning skills directly cause greater professional engagement.

Similarly, the very strong relationship between learning skills and teaching and learning indicates that teachers who reported stronger learning skills also perceived themselves as more competent in integrating technology into instructional delivery. Communication and creativity may relate to teachers' perceived ability to facilitate engaging digital instruction, while critical thinking may relate to the evaluation and meaningful selection of instructional technologies. Abella and Rosa (2023) noted that teachers with strong learning skills are better positioned to implement interactive, technology-supported instructional strategies that promote learner engagement and participation. Nevertheless, the present study did not directly observe how teachers implemented these practices in the classroom.

The strongest correlation was observed between learning skills and empowering learners. This result suggests that teachers who rated themselves highly in communication, collaboration, critical thinking, and creativity also tended to perceive themselves as more competent in promoting learner autonomy, accessibility, inclusion, and active participation through digital technologies. Quiño and Corpuz (2021) emphasized that teachers' pedagogical and collaborative competencies are important to learner empowerment and digital engagement. However, because the correlation approached $r = 1.00$, it should be interpreted with caution. The coefficient may reflect substantial conceptual overlap, similarly worded questionnaire items, restricted variability, or shared response tendencies rather than an almost perfect distinction-free relationship between the constructs.

The very strong relationship between learning skills and open education suggests that respondents with higher self-reported learning skills also perceived themselves as more competent in accessing, adapting, using, and sharing open educational resources. Creativity and collaboration may also be linked to teachers' willingness to explore innovative resources and participate in open-access educational communities. Borromeo et al. (2023) noted that collaborative and creative competencies support teachers' participation in open educational practices and digital knowledge-sharing initiatives. Because open education was a researcher-added domain, however, this relationship requires cautious interpretation and further construct-validation evidence.

Learning skills also had strong positive relationships with digital resources and facilitating learners' digital competence. These results suggest that teachers with higher self-reported learning skills tended to perceive themselves as more competent in selecting and using digital instructional materials and in guiding learners toward responsible and meaningful technology use. Communication, critical thinking, collaboration, and creativity may be relevant to evaluating digital resources, designing learner-centered activities, and supporting

students in digital environments. Still, these associations do not demonstrate the actual quality of the respondents' digital materials or learner-support practices.

Although assessment obtained the lowest correlation, its relationship with learning skills remained strong and statistically significant. This suggests that teachers who reported stronger learning skills also tended to report greater perceived competence in using digital tools to assess learning, monitor progress, analyze information, and provide feedback. The comparatively lower correlation may indicate that digital assessment requires specialized technical and pedagogical knowledge beyond general communication, collaboration, critical-thinking, and creativity skills.

The significant relationships across all domains are broadly consistent with the DigCompEdu framework's view of digital competence as a multidimensional construct involving professional, pedagogical, collaborative, reflective, and ethical practices rather than technical proficiency alone. Caena and Redecker (2021) emphasized that communication, collaboration, and critical thinking are relevant to teachers' engagement with digital pedagogies. Similarly, Ghomi and Redecker (2022) noted that teachers' digital competence requires cognitive and pedagogical foundations in addition to technical knowledge.

Based on the results, H_{01} , which stated that there is no significant relationship between respondents' learning skills and perceived digital competence, was rejected. The findings suggest that learning skills and perceived digital competence were positively associated among the participating teachers. However, they do not establish that strengthening learning skills would directly cause improvements in digital competence, instructional quality, learner engagement, or technology integration.

The exceptionally high coefficients, particularly $r=.98$, $r=.97$, and $r=.99$, should be interpreted cautiously. Learning skills and digital competence were measured from the same respondents through the same self-report questionnaire, response format, and data-collection period. Consequently, common method variance, overlapping item content, restricted response variability, social desirability, acquiescence bias, or self-enhancement may have inflated the relationships. Coefficients approaching ($r=1.00$) may also indicate that some subscales were not empirically distinct.

Therefore, the results should be understood as associations among self-reported learning skills and perceived digital competence rather than evidence of causal influence or demonstrated digital proficiency. Future studies may combine questionnaires with classroom observations, digital performance tasks, supervisor ratings, technology-integrated lesson plans, and other teaching artifacts. Further construct validation would also help determine whether learning skills and the digital competence domains measure sufficiently distinct concepts.

Relationship Between Literacy Skills and Digital Self-Efficacy

Table 7 presents the relationship between the respondents' literacy skills and perceived digital self-efficacy.

Table 7. *Test of Relationship Between Literacy Skills and Digital Self-Efficacy*

Digital Self-Efficacy Domain	n	r	p-value	Interpretation	Decision on H02
Technical Skills	180	.88	< .001	Very strong positive relationship	Reject
Problem-Solving	180	.80	< .001	Strong positive relationship	Reject
Adaptability	180	.71	< .001	Strong positive relationship	Reject
Online Safety	180	.74	< .001	Strong positive relationship	Reject
Overall Digital Self-Efficacy	180	.88	< .001	Very strong positive relationship	Reject

Note. Pearson's product-moment correlation was calculated using the respondent-level literacy-skills composite score and the respondent-level composite score for each digital self-efficacy domain ($N=180$). The literacy-skills composite represented the average of its 10 assigned items. Each digital self-efficacy domain composite represented the average of its 10 assigned items, while overall digital self-efficacy represented the average of all 40 digital self-efficacy items. Two-tailed significance was set at $\alpha=.05$. Values smaller than .001 were reported as $p<.001$ rather than $p=.000$.

The coefficients and two-tailed probability values presented in Table 5 were verified against the original statistical software output. The analysis used the composite scores of the 180 individual respondents and did not correlate the four digital self-efficacy means presented in the descriptive results.

The results revealed statistically significant positive relationships between literacy skills and all domains of digital self-efficacy. The correlation coefficients ranged from $r=.71$ to $r=.88$, with all relationships statistically significant at $p<.001$. These results indicate that teachers who reported stronger information, media, and technology literacy also tended to express greater confidence in performing digital tasks.

Literacy skills had a very strong positive relationship with technical skills ($r=.88$, $p<.001$). Strong positive relationships were also observed with problem-solving ($r=.80$, $p<.001$), adaptability ($r=.71$, $p<.001$), and online safety ($r=.74$, $p<.001$). Literacy skills also had a very strong positive relationship with overall digital self-efficacy ($r=.88$, $p<.001$). The strongest domain-level relationship was observed between literacy skills and technical skills, while adaptability had the weakest relationship.

These findings suggest that the respondents' reported ability to access, evaluate, interpret, and responsibly use digital information was associated with their confidence in operating digital technologies, addressing technical problems, adapting to new platforms, and practicing online safety. Literacy skills may help teachers engage with digital content, evaluate the credibility of online information, and reduce uncertainty when encountering unfamiliar technologies. Van Laar et al. (2020) emphasized that information and media literacy are foundational competencies for effective digital participation and technological confidence. However, the present findings represent associations between self-reported measures and do not establish that literacy skills directly produce higher digital self-efficacy.

The very strong relationship between literacy skills and technical skills suggests that teachers who reported stronger literacy skills also tended to feel more confident in operating digital devices, managing online learning systems, using productivity software, and navigating instructional technologies. The ability to understand and interpret digital information may be associated with greater confidence when using digital tools. Ballano et al. (2022) noted that teachers with stronger digital and information literacy tend to exhibit greater confidence in using instructional technologies and integrating digital resources into classroom instruction. Nevertheless, the study measured the respondents' confidence rather than their actual technical performance.

The strong relationship between literacy skills and problem-solving suggests that teachers who reported stronger literacy skills also expressed greater confidence in analyzing digital problems, identifying possible solutions, and making decisions when technical difficulties arose. Maran et al. (2022) explained that digital self-efficacy in problem-solving is supported when teachers can critically process and evaluate digital information. This relationship suggests an association between information-processing skills and perceived digital problem-solving ability, but it does not demonstrate that literacy skills caused improvements in troubleshooting performance.

The relationship between literacy skills and adaptability indicates that teachers with higher self-reported literacy skills also tended to express greater confidence in adjusting to changing technologies and instructional modalities. Digitally literate teachers may be more willing to explore unfamiliar applications, learn new platforms, and respond to educational innovations. Ayunar et al. (2024) emphasized that literacy and adaptability are interconnected competencies that support teachers' resilience and flexibility in digitally mediated educational environments. However, adaptability had the weakest correlation among the domains, suggesting that other personal, institutional, or contextual factors may also be associated with teachers' confidence in responding to technological change.

Literacy skills also had a strong positive relationship with online safety. This suggests that teachers who reported stronger literacy skills tended to express greater confidence in recognizing online risks, protecting data privacy, evaluating the credibility of digital sources, practicing responsible technology use, and promoting ethical online behavior. Letigio and Balijon (2022) highlighted that online safety awareness is closely associated with digital literacy because both require critical evaluation and responsible engagement with digital information. Nevertheless, actual knowledge and application of online safety practices would require verification through observed behavior, scenario-based assessment, or performance tasks.

The consistently significant relationships across all domains suggest that literacy skills extend beyond accessing information and are associated with teachers' confidence in navigating digital educational environments. Siddiq and Scherer (2022) noted that teachers with limited literacy skills may experience difficulties with digital engagement and technological adaptation. Similarly, Chonsalasin and Khampirat (2022) emphasized the relationship between digital literacy and teachers' confidence and willingness to adopt technology-enhanced instructional practices. These studies support the relevance of literacy skills to digital engagement, although the present correlational design does not permit conclusions about causal direction.

Based on these findings, H_{02} , which stated that there is no significant relationship between respondents' literacy skills and digital self-efficacy, was rejected. The results indicate that literacy skills were positively associated with technical skills, problem-solving, adaptability, online safety, and overall digital self-efficacy among the participating teachers. They do not establish that strengthening literacy skills would necessarily cause improvements in digital confidence, instructional innovation, learner engagement, or digital readiness.

The strong correlations should also be interpreted cautiously because literacy skills and digital self-efficacy may contain conceptually related or similarly worded indicators. All variables were measured from the same respondents using the same questionnaire format and response scale during a single data-collection period. Consequently, common method variance, restricted response variability, social desirability, acquiescence bias, and positive self-appraisal may have increased the strength of the observed relationships.

Conceptual overlap is also possible between literacy skills and digital self-efficacy. Literacy skills included the evaluation and responsible use of digital information, while technical skills, problem-solving, adaptability, and online safety measured confidence in performing related digital activities. For example, evaluating online information may be closely connected with confidence in identifying online risks, and using digital information may overlap with confidence in operating digital platforms. Thus, the observed relationships may represent both meaningful theoretical associations and shared questionnaire content.

The distinction is that literacy skills measured how frequently respondents reported engaging in information-, media-, and technology-literacy practices, whereas digital self-efficacy measured their confidence in performing digital tasks. However, without factor-analytic or discriminant-validity evidence, the study could not establish that respondents treated these domains as fully separate constructs.

Therefore, the findings should be understood as associations between self-reported literacy skills and digital confidence rather than evidence of demonstrated digital proficiency. Future studies may verify these relationships through digital performance tasks, observed troubleshooting activities, scenario-based online-safety assessments, classroom observations, supervisor ratings, and analyses of technology-integrated teaching artifacts. Literacy enhancement may be included in professional development initiatives, but its relationship with subsequent changes in digital self-efficacy should be evaluated through longitudinal or intervention-based research.

The significant relationships should be interpreted cautiously because all three major variables were measured through self-report responses collected from the same participants, using the same questionnaire format and response scale, during a single data-collection period. This measurement arrangement may have introduced common method variance, which could have increased the similarity of the responses and inflated the observed correlations. Therefore, the strength of the relationships may partly reflect the shared method of measurement rather than entirely distinct relationships among 21st-century skills, digital competence, and digital self-efficacy.

Overall, the inferential analyses examined two selected relationships. Learning skills were positively associated with all domains of perceived digital competence. In contrast, literacy skills were positively associated with all domains of digital self-efficacy and with the overall digital self-efficacy score. The study did not test literacy skills or life skills in relation to digital competence, learning skills or life skills in relation to digital self-efficacy, overall 21st-century skills in relation to overall digital competence, or overall 21st-century skills in relation to overall digital self-efficacy. Therefore, no conclusions were made regarding these untested relationships.

Limitations of the Study

The concentration of responses in the highest interpretive category indicates a possible ceiling effect and restricted response variability. This clustering may have limited the instrument's ability to distinguish among respondents with different levels of perceived skills, competence, and confidence. Social desirability may have encouraged respondents to present themselves as professionally competent, while acquiescence bias may have increased agreement with positively worded statements. Self-enhancement bias may also have led some respondents to evaluate their skills more favorably than an external observer or performance-based assessment would. Consequently, the descriptive means may overestimate the respondents' actual classroom practices or demonstrated digital abilities.

This study is subject to common method bias because the three major variables—21st-century skills, digital competence, and digital self-efficacy—were measured using a single self-report questionnaire administered to the same respondents at the same time. The instrument also employed the same four-point response format across its three major sections. Consequently, respondents' general response tendencies, such as consistently selecting positive options, may have affected all the measured variables similarly.

Construct overlap represents an additional limitation. Although the domains were theoretically differentiated by focus, several measured behaviors were conceptually close. Communication overlapped with professional engagement; literacy skills with technical skills and online safety; life-skills adaptability with digital adaptability; and learner-support practices with empowering and facilitating learners. The study relied on expert review and Cronbach's alpha but did not conduct exploratory factor analysis, confirmatory factor analysis, or discriminant-validity testing. Consequently, it could not determine whether the very high correlations represented strong substantive relationships, overlapping item content, a broader general-confidence factor, or a combination of these explanations.

This shared measurement method may have contributed to the very high mean scores and exceptionally strong correlations reported in the study. Some respondents may have provided socially desirable answers or rated themselves more positively because the questionnaire assessed professional skills and technology-related abilities. The absence of a neutral response option may also have encouraged respondents to select responses at the positive end of the scale. In addition, the 170-item questionnaire may have led to respondent fatigue, patterned responses, or reduced attention to distinctions among similar statements.

The findings therefore represent teachers' perceptions of their skills, competence, and confidence rather than direct evidence of their actual digital performance or classroom technology-integration practices. The very high correlations may partly reflect shared questionnaire wording, conceptual overlap among the constructs, or the use of the same respondents and response scale. Accordingly, the results should not be interpreted as conclusive evidence that teachers who rated themselves highly actually demonstrated an equivalent level of digital proficiency in practice.

The study did not use classroom observations, digital performance assessments, supervisor ratings, interviews, or teaching artifacts to verify the respondents' self-reported ratings. Because the study did not include these additional sources of evidence, it could not determine the extent to which perceived competence corresponded with demonstrated competence. The correlational, cross-sectional design also prevents conclusions about causal direction.

The study's external validity is limited by its geographical and institutional scope. Although total enumeration provided comprehensive coverage of the eligible teachers in the seven participating schools, the respondents came only from the Tagoloan East and West Districts under the Division of Misamis Oriental. The findings are therefore district-specific and context-bound. Differences in ICT infrastructure, internet connectivity, school leadership, access to digital resources, professional development, and local implementation of educational policies may produce different results in other districts or school systems.

Consequently, the findings should not be generalized to all public elementary school teachers in Misamis Oriental, other Philippine regions, private schools, secondary schools, higher education institutions, or the entire Philippine teaching population. The results are best understood as evidence about eligible teachers in the seven participating schools during School Year 2025–2026. Despite these limitations, the study provides district-level evidence concerning the perceptions of eligible public elementary school teachers in the seven participating schools. The results may help identify locally relevant areas for professional development and technology support. However, interpret them within the specific context of the Tagoloan East and West Districts, the participating schools, and the study's self-report measurement design.

Conclusion

The participating public elementary school teachers reported very high levels of 21st-century skills and digital self-efficacy and perceived themselves as very competent in using digital technologies. These results indicate positive perceptions of their professional practices, digital abilities, and confidence. However, the findings were

based entirely on self-report and should not be interpreted as direct evidence of demonstrated digital readiness, classroom performance, or technology-integration proficiency. The concentration of scores in the highest category also suggests possible ceiling effects, social desirability, acquiescence bias, and self-enhancement.

The correlational findings were limited to two selected relationships. First, learning skills had statistically significant positive relationships with all domains of perceived digital competence. This indicates that teachers who reported stronger communication, collaboration, critical-thinking, and creativity skills also tended to report higher competence in professional digital engagement, digital resource use, technology-supported teaching and assessment, learner empowerment, facilitation of learners' digital competence, and open education.

Second, literacy skills had statistically significant positive relationships with all domains of digital self-efficacy and with the overall digital self-efficacy score. This indicates that teachers who reported stronger information, media, and technology literacy also tended to express greater confidence in their technical skills, digital problem-solving, adaptability, and online safety.

The correlational findings address only the relationship between learning skills and perceived digital competence and the relationship between literacy skills and digital self-efficacy. The study did not examine literacy skills or life skills in relation to digital competence; learning skills or life skills in relation to digital self-efficacy; overall 21st-century skills in relation to overall digital competence; or overall 21st-century skills in relation to overall digital self-efficacy. Accordingly, we made no conclusions about these untested relationships.

The conclusions are limited to the 180 public elementary school teachers from the seven participating schools in the Tagoloan East and West Districts during School Year 2025–2026. Although total enumeration provided comprehensive coverage of the defined local population, it did not establish representativeness beyond these schools and districts. Therefore, the findings should not be generalized to all public elementary school teachers, other educational levels, or the broader Philippine education system.

Furthermore, interpret the observed relationships cautiously because all variables were measured through the same self-report questionnaire administered to the same respondents at one point in time. Shared method variance, overlapping questionnaire content, and positive response tendencies may have increased the strength of the correlations. The results indicate statistical associations and do not establish causal effects or demonstrate digital proficiency.

In educational practice, the findings may inform professional development initiatives that address communication, collaboration, critical thinking, creativity, literacy, adaptability, digital competence, and digital self-efficacy. Teacher training programs may provide experiential and technology-enhanced learning opportunities that support teachers' continued development in digital pedagogy and their confidence in using digital tools. School administrators may also offer Learning Action Cell sessions, peer mentoring, and collaborative digital learning opportunities aligned with the areas identified in the descriptive results. Because the study was correlational, these initiatives should be evaluated independently to determine whether they are associated with subsequent changes in teachers' competence, confidence, or instructional practices.

From a policy perspective, the findings highlight the importance of developing institutional and district-level initiatives that support teachers' digital readiness and technology integration capabilities. Educational policymakers may use the findings as district-level evidence when planning digital education programs, ICT infrastructure, and teacher capacity-building initiatives aligned with the Philippine Professional Standards for Teachers and national digital-transformation goals. However, the study does not establish that these initiatives will directly improve competence, confidence, or instructional outcomes.

The findings also suggest important implications for future research. Future studies should examine these variables across multiple districts, divisions, and geographical contexts using larger, more diverse samples. Comparative studies may include urban and rural schools, public and private institutions, and different educational levels. Probability sampling from a broader population would provide stronger support for generalization. At the same time, replication in other settings would help determine whether the relationships observed in the Tagoloan East and West Districts are consistent across Philippine school contexts.

Because the present questionnaire contains 170 items and the study included 180 respondents, the sample may be insufficient for a stable factor analysis of the complete instrument. Future validation studies should therefore use a substantially larger and independent sample or validate the major scales separately before testing their structural relationships.

Contributions of Authors

Author 1: Conceptualized and designed the study; developed the research methodology and instruments; conducted data gathering, data analysis, and interpretation; and prepared and revised the manuscript.

Author 2: Provided research supervision and academic guidance and reviewed the manuscript for accuracy and clarity.

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Conflict of Interests

None

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