Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 9 (2026)

Teachers' Digital Instructional Practices

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Publication Date: September 23, 2026 DOI: **10.5281/zenodo.22918060**

Abstract

The study examined the extent to which public school teachers employed digital instructional practices across four domains: planning for digital lesson design, technology integration for instruction, student engagement, and digital assessment and feedback. The study used a quantitative descriptive design, and data were obtained from 79 teacher-respondents from different grade levels and subject areas. The results showed that most of the respondents were mature educators, mostly female, with postgraduate degrees, and with a family income of Php12,000 or more per month. Moreover, teachers exhibited a high level of digital instructional practices across all four domains, reflecting a strong readiness to integrate technology into teaching and learning. When grouped by age, sex, educational attainment, and income, performance was consistently high, reinforcing the notion that demographic and socio-economic variables did not create disparities in digital capability. The inferential analysis did not reveal any significant differences in digital lesson design planning across the categories, suggesting a uniform standard of competence within the workforce. The study concludes that the digital instructional capability is widely distributed among teachers regardless of their background. Building on this strong foundation, professional development efforts should not be limited to basic online literacy but should instead emphasize advanced skills, including AI-enabled teaching, learning analytics, adaptive systems, and complex automated diagnostics to drive classroom innovation.

Keywords: Teachers, Digital Instruction, Instructional Practices

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 9 (2026)

Introduction:

Nature of the Problem

Digital instructional practices refer to the incorporation of ICT throughout the process of designing, implementing, assessing, and managing learning experiences. As speculated in Dep Ed order number 003, s. In 2026, aligning with the UN's Sustainable Development Goal 4 (Quality Education), it emphasizes the use of ICT and AI to generate learning experiences while maintaining privacy and inclusion. These instructional practices incorporate the Technological Pedagogical Content Knowledge (TPACK) framework, which explains how teachers integrate technology into their teaching through the intertwined domains of content, pedagogy, and technology (Mishra & Koehler, 2006; UNESCO, 2023).

The rapid advancement of technology and the evolution of learning infrastructures have reshaped the way we teach and learn. In today's trends, teaching through digitalization is no longer optional but a key measure of educational quality (Celik, 2023; UNESCO, 2024). In basic education, therefore, it is not enough for a teacher to know how to manipulate ICT tools. What is important is that a teacher can design a lesson using technology to enhance learners' learning (Kafa, 2025) across the four domains: digital lesson design, technology integration, student engagement, and digital assessment and feedback.

Despite such advancements, many schools faced uneven readiness. Although policies have been introduced to strengthen teachers' digital skills, gaps remain, including varying technical skills and inconsistent support across districts (Engageli, 2026; Fullan et al., 2024). So, to truly understand how teachers use digitalization in their classroom instruction, it is important to measure current instructional practices and examine the demographic and socioeconomic factors that might influence them. These also determine the existing performance gaps and identify the group of teachers. This approach ensures that professional development is not one-size-fits-all, but instead tailored to the diverse realities of teachers. teachers who need more support (Howard et al., 2021; Siddiq & Scherer, 2021).

As a teacher in remote areas for several years, I have observed that many learners have low digital literacy awareness due to financial constraints (too expensive), compounded by a lack of reliable internet access. The personal experiences of handling learners who are "left behind" in digitalization became the impetus for the study to search for a low-cost ICT intervention to improve student performance. Using evidence from this study, the goal is to create practical, equitable opportunities for teachers to strengthen their digital competencies. Not only to improve technical skills, but to empower teachers to use technology meaningfully, whether in lesson planning, classroom instruction, student engagement, or assessment.

Current State of Knowledge

Teachers’ digital instructional practices have become central to contemporary education, reflecting the increasing integration of multimedia resources, artificial intelligence, interactive applications, and online platforms into classroom instruction. Digital competence enables teachers to design flexible, personalized, and context-responsive learning experiences, while information and communication technology (ICT) supports more student-centered learning environments (Quindemil-Torrijo et al., 2026; Noor-Ul-Amin, 2022). However, technological

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 9 (2026)

tools become educationally meaningful only when supported by sound pedagogical design, subject knowledge, and ethical judgment (Patiño Hernández et al., 2026).

Digital teaching competencies include the ability to use word processors, presentation software, online platforms, and collaborative applications to enhance instruction and address diverse learning needs. These competencies range from basic to advanced levels and involve managing digital learning environments, creating instructional content, facilitating online discussions, and promoting learner collaboration (Karikari, 2022; Korte et al., 2020). ICT also contributes to teacher education by supporting communication, feedback, instructional preparation, professional development, classroom management, and the development of creative teaching strategies (Bhattacharjee & Deb, 2022; Cajilig, 2021).

Sayson et al. (2025) investigated teachers' competence in handling ICT-based instruction at Bacolod City National High School, focusing on technological competencies involving online learning resources, word processing, and spreadsheet applications. The study also considered teachers' demographic characteristics in assessing their technological competence. Similarly, Azarcon et al. (2023) examined the technical difficulties encountered by public high school teachers in using Microsoft Office programs, multimedia platforms, and e-learning resources. These investigations establish that teachers' effective use of digital technologies involves both the development of technological competencies and the management of technical challenges. Their findings provide a foundation for the present study, which extends the investigation beyond general ICT competence and technical difficulties by examining digital lesson design, technology integration for instruction, student engagement, and digital assessment and feedback.

Furthermore, Caguan et al. (2025) investigated difficulties encountered by college students in online mathematics learning and found moderate difficulties involving technological devices and the learning environment, while teacher competence-related difficulties were low. This finding highlights the importance of considering the broader learning environment when evaluating technology-supported instruction. Meanwhile, Guanzon et al. (2025) explored digital leadership and management in education, providing a complementary institutional perspective on educational technology integration. Collectively, these studies establish the relevance of technological competence, learning conditions, and institutional support in digital education. However, they do not directly provide a comprehensive assessment of teachers' instructional practices across the four domains investigated in the present study. This gap supports the need to examine how public school teachers design digital lessons, integrate technology, engage learners, and conduct digital assessment and feedback.

Digital lesson design planning has evolved beyond conventional lesson preparation into a multimodal, inclusive, and technology-enhanced process. Teachers are expected to select and adapt digital tools, multimedia materials, simulations, and AI-supported resources to create engaging and accessible learning experiences. Zhussupova et al. (2026) emphasized the value of multimodal approaches, while Mercier (2025) highlighted the importance of accessibility and inclusivity in designing lessons for learners with varying abilities and contexts. Similarly, Mateo (2025) found that AI can improve lesson organization and efficiency, although teacher mediation, contextual relevance, and ethical safeguards remain essential.

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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Technology integration for instruction involves embedding digital tools meaningfully into the teaching-learning process rather than merely using technology for its own sake. Effective integration promotes collaboration, adaptability, creativity, and student-centered learning through digital platforms, simulations, multimedia, and interactive applications (Patiño Hernández et al., 2026). Nevertheless, research indicates that basic computer literacy alone is insufficient. Teachers require pedagogical knowledge, confidence, professional development, and institutional support to integrate technology effectively (Murithi & Yoo, 2021; Ghavifekr et al., 2022; Caluza et al., 2020).

Student engagement is a significant dimension of digital instructional practices because technology-supported instruction can stimulate curiosity, participation, collaboration, and ownership of learning. Digital engagement is associated with motivation, self-regulated learning, and academic performance, particularly when teachers provide support and collaborative learning opportunities (Li et al., 2026). Philippine studies also reported that digital tools such as AI applications, Google Classroom, Quipper, Messenger, and multimedia platforms can improve participation, confidence, and academic achievement when used purposefully and appropriately (Getigan, 2026; Abenez, 2025).

Finally, digital assessment and feedback have transformed evaluation into a continuous, personalized, and responsive process. Digital quizzes, simulations, dashboards, and online platforms allow teachers to monitor learner progress and provide timely feedback, although automated results still require teacher interpretation and ethical oversight (Zhussupova et al., 2026). Local research further shows that effective digital instructional practices depend on infrastructure, teacher competence, professional development, leadership, and contextual adaptation. Studies by Munalem and Pagaduan (2026), Colegado (2025), Pardo (2021), and Marcial and Fortich (2020) emphasize the need for sustained training, adequate resources, technical support, and locally relevant digital strategies to ensure meaningful and equitable technology integration.

Theoretical Underpinnings

Theories of ICT proficiency among teachers were based on a foundational framework explaining modern digital instructional practices: Connectivism Theory, developed by George Siemens and Stephen Downes, often referred to as a learning theory for the digital age (Siemens, 2005; Downes, 2010).

Connectivism, introduced by George Siemens, views learning as a process of building and navigating networks of information, people, and digital tools. It emphasizes that knowledge is no longer stored only in the minds of individuals but is distributed across connections, that is, between teachers, students, and technology.

The study focused on the level of public-school teachers' digital instructional practices across four domains: digital lesson design planning, technology integration for instruction, student engagement, and digital assessment and feedback, which fits naturally within this theory.

In the aspect of Digital Lesson Design Planning, Connectivism highlights that learning resources are composed of multimedia and tech-enabled curricula in order to connect learners to diverse knowledge nodes; Technology Integration for Instruction, through the use of apps,

platforms, and AI tools, where teachers act as network facilitators, guiding students to access, filter, and apply information from multiple digital sources; Student Engagement, where Connectivism stresses collaboration and interaction. Digital platforms allow students to co-create knowledge, share insights, and learn actively within a connected community; and Digital Assessment and Feedback, where automated tools provide immediate, personalized feedback, reflecting Connectivism's principle that learning is continuous, adaptive, and shaped by real-time connections.

In essence, this study shows that teachers are not just using technology but embodying Connectivism, helping students learn through networks of digital tools, peers, and information flows. Measuring these practices reveals how well teachers are positioned to thrive in a world where "the ability to know where to find knowledge is more important than what is already known."

Objectives of the Study

This study determined the level of competence of elementary teachers in the implementation of the Aral Program in one of the Schools Divisions in the Negros Island Region during School Year 2025–2026, as a basis for developing a capacity-building plan. Specifically, it examined the respondents' profiles in terms of age, highest educational attainment, length of service, and average family monthly income; assessed their level of competence in implementing the Aral Program in terms of instructional competence, remediation and intervention skills, assessment competence, and monitoring and evaluation; and determined whether there was a significant difference in their level of competence when grouped according to the identified profile variables.

Research Methodology:

This section presents the research design, study respondents, instrumentation, data-gathering procedure, data analysis and statistical tools, and ethical consideration.

Research Design

The descriptive research design is a scientific method that involves observing and describing a subject's behavior without influencing it. Descriptive research is often used as a precursor to quantitative research designs, providing a general overview that offers valuable pointers on which variables are worth testing quantitatively (Shuttleworth, 2021).

Descriptive research aims to describe a population, situation, or phenomenon accurately and systematically. Descriptive research is an appropriate choice when the research aims to identify characteristics, frequencies, trends, and categories (McCombes, 2020).

This study used a quantitative descriptive research design to test for significant difference between teachers' digital instructional practices and their demographic profiles in one of the divisions in Southern Negros. Descriptive studies are valuable in gaining more knowledge about the phenomenon under study. Moreover, descriptive research was used to illustrate the characteristics of the population or phenomenon under study. A descriptive research design is

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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valuable to the present study, as it provides facts and scientific judgment. Also, this design is appropriate for the study, as it helps reveal patterns and connections that might otherwise go unnoticed, present situations, and determine the prevailing issues, thereby enabling adequate and accurate interpretation of the data.

Study Respondents

This study was confined to 79 of 98 elementary teachers in an urban school in Southern Negros during the School Year 2025-2026. The study used Cochran's formula to determine the required sample size. After determining the sample size, stratified random sampling was employed to allocate the sample across courses. This means that the researcher chose subjects and study locations to help one understand the topic at hand and the central phenomenon under study (Kisanga, 2022). The sampling technique eliminated sampling biases and ensured that everyone in the population had a fair chance of being chosen for the sample.

Instrument

The researcher developed a questionnaire to assess teachers' digital instructional practices in a district within a large division for School Year 2025–2026, serving as the basis for a skills training plan. The instrument consisted of two parts: Part I gathered respondents' profiles in terms of age, sex, highest educational attainment, and average monthly family income, while Part II measured digital instructional practices across four areas—digital lesson design planning, technology integration for instruction, student engagement, and digital assessment and feedback—with 10 items per area, totaling 40 items. Responses were rated using a five-point Likert scale ranging from 5 (Always) to 1 (Almost Never). Face validation was conducted by three experts in education, curriculum, language, and research, whose recommendations were incorporated into the final instrument. Using the criteria of Good and Scates, the questionnaire obtained a validity rating of 4.93, interpreted as excellent. Reliability testing was subsequently conducted through a dry run involving 30 teachers from another division who were not included in the study sample. Cronbach's Alpha was employed to determine internal consistency, following Forero (2022), who described it as an estimator of test reliability, and Taber (2021), who noted that values of 0.70 or higher indicate acceptable internal consistency. The questionnaire obtained a reliability coefficient of 0.794, indicating very high internal consistency and confirming its suitability for the study.

Data Gathering and Procedure

After computing for the reliability of the survey questionnaire, the researcher asked the authority of the Schools Division Superintendent through a letter requesting permission to conduct the study. Upon approval, the researcher set a schedule for data collection with a letter requesting permission from the School Principals. The researcher administered and retrieved the research instrument to ensure 100% retrieval. After retrieval, the data were tabulated, analyzed, and interpreted in accordance with the specific problems outlined in this study.

Scores for each respondent were coded by variable, and computations were performed using SPSS. Likewise, statistical tables were constructed with the objectives stated in the study in mind. The reliability of the questionnaire was determined using Cronbach's Alpha, yielding 0.794, which is interpreted as acceptable internal consistency of the instrument and thus reliable.

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Data Analysis and Statistical Treatment

This study employed two analytical schemes based on its research objectives: descriptive and comparative. For Objective No. 1, a descriptive-analytical scheme using frequency and percentage distributions was employed to determine the respondents' profiles in terms of age, sex, highest educational attainment, and average family monthly income, thereby describing the condition, status, patterns, and trends relevant to the investigation. Objective No. 2 also utilized a descriptive-analytical scheme, using the mean to determine the level of teachers' digital instructional practices in terms of digital lesson design planning, technology integration for instruction, student engagement, and digital assessment and feedback. Meanwhile, Objective No. 3 employed a comparative analytical scheme using the Mann–Whitney U-test to determine whether significant differences existed in the level of teachers' digital instructional practices when respondents were grouped and compared according to the identified profile variables.

Ethical Consideration

The study observed ethical principles to protect participants' rights, welfare, and privacy throughout the research process. Voluntary participation was ensured by providing prospective participants with a clear explanation of the study procedures, possible risks, and their rights, allowing them to make an informed decision to participate or decline without coercion (Trochim, 2021). The researcher also took measures to minimize potential physical and psychological harm by considering participants' well-being and ensuring that the research process did not expose them to unnecessary risks. Furthermore, confidentiality was strictly maintained by limiting access to participants' information to authorized individuals and ensuring that identifying details and shared responses were not disclosed to the public or unauthorized persons. These safeguards upheld the participants' right to privacy and reinforced the researcher's ethical responsibility to protect sensitive information throughout the study.

Results and Discussion:

This section presents, analyzes, and interprets the data gathered to carry out the predetermined objectives of this study.

Profile of the respondents

Table 1

Profile of the Respondents

Variable	Category	Frequency	Percentage (%)
Age	Younger (Below 33 years old)	27	34.2
	Older (33 years old and	52	65.8

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	above)		
	Total	**79**	**100.0**
Sex	Male	38	48.1
	Female	41	51.9
	Total	**79**	**100**
Highest Educational Attainment	Lower (Bachelor's degree)	25	31.6
	Higher (MA and PhD)	54	68.4
	Total	**79**	**100.0**
Average Family Monthly Income	Lower (Below Php12,000)	32	40.5
	Higher (Php12,000 and above)	47	59.5
	Total	**79**	**100.0**

Table 1 highlights the demographic profile of the 79 respondents across age, sex, highest educational attainment, and average family monthly income. In terms of age, the majority of respondents belong to the older bracket of 33 years old and above (65.8%, f=52), while those below 33 years old account for 34.2% (f=27). This age distribution suggests a mature sample group with substantial life and professional experience, which enhances the reliability and depth of their responses.

Regarding sex, female respondents slightly outnumber males at 51.9% (f=41) compared to 48.1% (f=38), representing a balanced gender proportion that minimizes gender bias while reflecting broader demographic trends in academic and administrative settings (David et al., 2020). When examining educational background, a substantial majority (68.4%, f=54) have attained post-graduate degrees (MA and PhD), while 31.6% (f=25) hold a bachelor's degree. This elevated educational profile indicates that the respondents possess high critical-thinking capabilities and specialized knowledge, which directly boosts the validity of the study's findings, as advanced education correlates closely with professional competency and strategic decision-making (Mendoza & Garcia, 2021). Lastly, for average family monthly income, 59.5% (f=47) earn Php 12,000 and above, whereas 40.5% (f=32) earn below Php 12,000. Based on standard economic benchmarks (Philippine Statistics Authority, 2021), this demonstrates that while most respondents enjoy relative financial stability, a significant portion still faces economic vulnerabilities that can affect household purchasing power.

The overall profile reveals a mature, highly educated, and moderately affluent respondent group capable of providing well-informed perspectives. The strong prevalence of post-graduate education underscores a well-qualified sample, yet the 40.5% presence of lower-income earners highlights a disparity between educational attainment and financial compensation. The primary implication for institutions and policymakers is the need to align educational qualifications with

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better economic compensation, ensuring equitable salary scales and professional advancement programs that translate advanced degrees into improved household financial security.

Level of teachers' digital instructional practices

Table 2

Level of teachers' digital instructional practices in the area of Digital lesson design planning

Digital lesson design planning		
Items	**Mean**	**Interpretation**
1. use Canva for visually engaging, ready-made lesson plan templates.	**3.92**	High
2. use appropriately slide presentations, videos, audio and other media in the classroom.	3.66	High
3. use digital tools to provide different types of content or supports to meet individual learning needs.	3.70	High
4. search and collect textual and non-textual information from online and offline sources.	3.84	High
5. store and organize collected information using directories, drives or databases.	3.84	High
6. distribute, share, publish and print information via print or web.	3.80	High
7. utilize digital activities promote communication, collaboration, critical thinking, and creativity.	**3.57**	High
8. use digital platforms like Google Classroom, MS Teams, Moodle.	3.80	High
9. plan direct links to YouTube videos, podcasts, and interactive graphics to cater to diverse learning styles.	3.62	High
10. prefer Google Drive or Microsoft OneDrive for centralized resource access and real-time co-planning.	3.89	High
Overall Mean	**3.76**	**High**

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Table 2 presents the level of teachers' digital instructional practices in the area of Digital Lesson Design Planning with an overall Mean of 3.76, interpreted as "High" which indicates that teachers consistently integrate digital tools, platforms, and media resources into their lesson preparation routines.

Among the ten indicators, Indicator 1 ("use Canva for visually engaging, ready-made lesson plan templates") obtained the highest mean of 3.92 interpreted as "High". On the other hand, Indicator 7 ("utilize digital activities to promote communication, collaboration, critical thinking and creativity") posted the lowest mean of 3.57 interpreted as "High".

The results suggest that there is a successful integration of technology in the initial stage of teaching process like the use of Canva and cloud systems such as Google Drive which are evidences that teachers manifested strong reliance on intuitive platforms, to enhance teaching and learning, thereby saving time and allow seamless material management (Karikari (2022). Although, teachers need a range of digital skills to integrate technology effectively into the curriculum.

In the midst of these situations, Murithi and Yoo (2021) realized that although many teachers possess basic computer literacy, challenges can still emerge due to insufficient pedagogical knowledge. Thus, citing the importance of professional development that goes beyond basic computer skills and focuses on the effective integration of technology into different subjects since according to Caluza et al. (2020) emphasized that teachers must also know where and when to use technology for teaching and other related tasks. Such professional development must be continuous and focused on active digital learning strategies, collaborative activities, interactive problem-solving, and other technology-supported approaches to strengthen students' communication, collaboration, critical thinking, and creativity. At the end, this provision can empower teachers to create richer interactive tasks that actively stimulate students' critical thinking and collaborative skills.

Table 3

Level of teachers' digital instructional practices in the area of Technology integration for instruction

Technology integration for instruction		
Items	**Mean**	**Interpretation**
1. use interactive technology like smartboards, tablets, etc. for teaching.	**3.92**	High
2. require students to use technology for a activities.	3.66	High
3. use online tools like Kahoot and Google Forms.	3.70	High
4. use digital collaboration tools like Google Docs, Teams, and Padlet.	3.84	High

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5. incorporate multimedia videos and simulation into your lessons.	**3.43**	Moderate
6. use various multimedia materials for the reports and class presentations.	3.49	Moderate
7. use various synchronous and synchronous communication tools (email, chat, white boards, forum, blogs).	3.75	High
8. use emails, group sites, blogs, etc. for disseminating information directly to students.	3.80	High
9. implement online platforms for immediate, actionable feedback to inform instruction.	3.57	High
10. tailor activities to meet individual student needs through adaptive learning technologies.	3.37	Moderate
Overall Mean	**3.65**	**High**

The findings presented in Table 3 depict the level of teachers' digital instructional practices in the area of Technology Integration for Instruction, yielding an overall mean of 3.65, which is interpreted as High. This overall shows that teachers use digital technology in their teaching routine quite actively, demonstrating high technological adoption and orientation toward updating classroom activities.

As for individual practices, indicator 1 stating "use interactive technology like smartboards, tablets, etc. for teaching." Got the highest Mean of 3.92, interpreted as "high" while item number 5. "Incorporate multimedia videos and simulation into your lessons"achieved lowest mean of 3.43 interpreted as "moderate'.

The moderate rating suggests that while teachers recognize the value of multimedia videos and simulations, these tools are not yet consistently or fully integrated into their teaching practices. Unlike interactive technologies such as smartboards and tablets (which scored high at 3.92), videos and simulations may require more preparation time, technical skills, and reliable infrastructure. This gap implies that teachers are more comfortable with direct-use technologies (like smartboards and tablets) that support immediate classroom interaction, but they face challenges in embedding multimedia and simulations into lesson flow. Barriers may include limited access to stable internet or devices, lack of training in designing or curating simulation-based activities and the perception that multimedia requires extra effort compared to traditional methods.

These results are supported by Zhussupova et al. (2026) emphasize that multimodal digital tools (videos, simulations, interactive apps) enhance comprehension but require teacher competence and institutional support to be effective.

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Korte et al. (2020) pointed out that teachers' ICT platform skills comprise using digital technology for content creation, communication, collaboration, and engaging experience. However, low means in adaptive learning and multimedia and simulations show that there is still an existing pedagogical gap because technology is mostly used to enhance traditional instruction rather than differentiate or transform it. Adaptive learning systems and interactive simulations demand high technological self-efficacy, special training, robust digital infrastructure and sufficient time for preparation that teachers lack.

Consequently, while basic and collaborative digital practices flourish, advanced pedagogical practices such as personalized, data-driven adaptive learning remain underutilized.

Table 4

Level of teachers' digital instructional practices in the area of Student engagement

Student Engagement		
Items	**Mean**	**Interpretation**
1. allow students to demonstrate understanding through creative, technology-based assignments, such as producing podcasts, videos, or digital presentations.	**3.81**	High
2. use digital tools to provide different types of content or supports to meet individual learning needs.	3.62	High
3.use digital platforms to give students choice in how they demonstrate their learning	**3.43**	Moderate
4. embed technology into daily classroom routines, ensuring support learning objectives.	3.49	Moderate
5. track individual progress using digital tools and adjust instruction accordingly.	3.75	High
6. utilize differentiated instruction through digital means.	3.62	High
7. use tools to make lessons more interactive, which increases curiosity and motivation.	**3.43**	Moderate
8. use synchronous and asynchronous web-based communication tools like instant messengers, voice, and teleconferencing.	3.49	Moderate
9. enable students to design original products like logo design in Canva and podcasting.	3.53	High
10. creating a virtual presence through regular updates,	3.58	High

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personalized video/audio feedback.		
Overall Mean	**3.58**	**High**

The data presented in Table 4 illustrates the level of teachers' digital instructional practices in the dimension of Student Engagement, yielding an overall mean of 3.58, which corresponds to a "High" level of practice. This indicates that educators generally exhibit strong competence and consistency in leveraging technology to promote learner participation, active involvement, and customized learning experiences.

The highest mean of 3.81 interpreted as High was obtained for Item 1 stating "allow students to demonstrate understanding through creative, technology-based assignments, such as producing podcasts, videos, or digital presentations", and closely followed by Item 5 stating "track individual progress using digital tools and adjust instruction accordingly" at 3.75 ("High").

Whereas Item 3 stating "use digital platforms to give students choice in how they demonstrate their learning" got the lowest Mean of 3.43 interpreted as moderate and Item 7 stating" use tools to make lessons more interactive, which also got the same Mean rating.

The moderate rating shows that teachers sometimes allow students to choose how they demonstrate learning (e.g., videos, presentations, digital portfolios), but such practice is not consistent. It suggests hesitation or limited familiarity with platforms that support diverse outputs. When students are given choice, they feel more ownership and motivation, but the data implies this is not yet a common classroom norm. Similarly, using tools like quizzes, polls, or gamified apps to make lessons interactive is acknowledged but not maximized. Teachers may use them occasionally, but barriers such as technical skills, time, or access prevent full integration. This reflects a transitional stage where digital interactivity is valued but not yet habitual.

In short, the moderate ratings imply that teachers are at an early adoption stage: they see the value of student choice and interactive tools but have not yet fully integrated them. Strengthening confidence, access, and training will help move these practices from "moderate" to "high" in everyday teaching.

Table 5

Level of teachers' digital instructional practices in the area of Digital assessment and feedback

Digital assessment and feedback		
Items	**Mean**	**Interpretation**
1. Explore the use of electronic assessment tools like online testing, submission of projects via email or online facilities.	**3.41**	Moderate
2. Design rubrics for assessing student performance in the use of	3.73	High

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Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
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various technologies.		
3. Use electronic means of administering quizzes and examinations.	3.51	High
4. Analyze assessment data using spreadsheets and statistical applications.	3.65	High
5. Use video or audio tools to provide personalized feedback	3.49	Moderate
6. Use digital assessment data to adjust my instruction.	3.75	High
7. Provide timely feedback on digital assignments.	3.62	High
8. Utilize digital devices for assessment like Laptop, Desktop, Tablet and Smart for assessment.	3.66	High
9. Provide real-time feedback, allowing students to track their own progress.	3.75	High
10. Organized digital records make it easier for teachers to analyze long-term performance trends and share evidence-based reports with parents or administrators.	**4.15**	High
Overall Mean	**3.67**	**High**

The data presented in Table 5 details the level of teachers' digital instructional practices in the domain of Digital Assessment and Feedback, yielding an overall mean of 3.67, interpreted as "High." Which implies that educators successfully use digital tools when assessing learner performance, giving formative feedback and managing academic analytics.

The highest mean of 4,15 interpreted as High,was reached for Item 10 stating "Organized digital records help teachers identify performance trends over time and give evidence-based reports to parents or administrators". Thus, teachers consider it highly valuable to keep digital records and use digital assessment data for systematic performance monitoring and communication with stakeholders.

Conversely, the lowest mean score of 3.41 interpreted as "moderate"was observed in Item 1 stating "Explore the use of electronic assessment tools like online testing, submission of projects via email or online facilities".

On Electronic assessment tools, the moderate rating indicates teachers are in the stage of experimenting with online testing, project submissions via email, or learning management systems, but is not consistently. This shows a transitional stage where traditional paper-based methods still dominate, and digital tools are used selectively. As to their perspective indicate that many educators may see the potential benefits such as faster feedback, easier record-keeping, and more flexible submissions however challenges like internet reliability, limited training, and concerns about fairness or authenticity slow down the full adoption. For learners, moderate use means they occasionally experience the convenience of online submissions or quizzes, but

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indicate heavy reliance on traditional formats. This can limit opportunities for personalized feedback and self-paced learning. Such results is supported by a meta-synthesis study by Elif Tuna Pusa and Serkan Dinçer (2025) found that while e-assessment tools such as e-portfolios, online quizzes, and LMS platforms provide personalized feedback and enhance learner autonomy, their integration is hindered by technical constraints and limited ability to assess higher-order thinking skills. The study concludes that addressing these barriers is essential for realizing the full potential of digital assessment in education.

As pointed out by Borte et al. (2023) and OECD (2023), personalizing multimedia feedback and working with e-assessment platforms demands much time, tech skills, and software tools, which often make teachers rely on traditional text feedback and submission systems.

As suggested by Caluza et al. (2020), professional development should help teachers move beyond basic ICT skills toward purposeful and effective technology integration. Thus, the Skills Training Plan may include practical training on online assessment platforms, digital submission tools, electronic rubrics, and audio or video feedback.

Comparative Analysis of the Level of Teachers' Digital Instructional Practices

Table 6

Differences in the Level of Teachers' Digital Instructional Practices in the area of Digital Lesson Design Planning when grouped and compared according to variables

Digital Lesson Design Planning							
Variables	**Categories**	**N**	**Mean Rank**	**Mann Whitney U-test**	**Sig. Level**	**p-value**	**Interpretation**
Age	Younger	27	39.94	700.50		0.988	Not Significant
	Older	52	40.03				
Sex	Male	38	38.28	713.50	0.05	0.519	Not Significant
	Female	41	41.60				
Highest Educational Attainment	Lower	25	42.74	606.50		0.468	Not Significant

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	Higher	54	38.73			
	Lower	32	41.94			
Average Family Monthly Income				690.00	0.534	Not Significant
	Higher	47	38.68			

The statistical results presented in Table 23 illustrate the comparative analysis of teachers' digital instructional practices in the area of Digital Lesson Design Planning when grouped according to demographic and socioeconomic variables, utilizing the Mann-Whitney U-test at a 0.05 significance level. When grouped by Age, younger teachers ($N=27$, Mean Rank = 39.94) and older teachers ($N=52$, Mean Rank = 40.03) demonstrated comparable rank scores, yielding $U=700.50$ and a p-value of 0.988, indicating no statistically significant difference ($p>0.05$). Similarly, when categorized by Sex, male respondents ($N=38$, Mean Rank = 38.28) and female respondents ($N=41$, Mean Rank = 41.60) showed no significant variation ($U=713.50, p=0.519$).

Regarding Highest Educational Attainment, teachers with lower educational attainment ($N=25$, Mean Rank = 42.74) and those with higher educational attainment ($N=54$, Mean Rank = 38.73) exhibited no statistically significant difference ($U=606.50, p=0.468$). Finally, when grouped by Average Family Monthly Income, teachers serving lower-income students ($N=32$, Mean Rank = 41.94) and higher-income students ($N=47$, Mean Rank = 38.68) recorded $U=690.00$ and a p-value of 0.534, which is likewise interpreted as Not Significant.

The overarching analysis indicates that teachers' practices in planning and designing digital lessons are non-discriminatory and statistically uniform across all tested personal, professional, and socioeconomic profiles.

In terms of the Level of Teachers' Digital Instructional Practices in the area of Digital Lesson Design Planning when grouped and compared according to variables, the null hypothesis is accepted.

The absence of significant differences suggests a widespread integration of digital lesson planning into basic instructional competencies, indicating that age, gender, educational level, and student socioeconomic status no longer create digital divides or operational disparities in instructional preparation. This homogenizing trend reflects post-pandemic institutional shifts, wherein universal curriculum standards, mandatory professional development programs, and standardized digital tools such as learning management systems and digital lesson repositories have established a consistent baseline of planning competence across all educator profiles.

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These findings align with recent empirical studies in educational technology; as highlighted by Tondeur et al. (2023) and Howard et al. (2021), demographic factors such as age and sex are increasingly irrelevant predictors of digital pedagogical competence when teachers receive equitable institutional support and technology access. Furthermore, Santos et al. (2024) and Al-Maroof et al. (2021) observe that post-2020 professional development mandates have effectively democratized digital lesson planning capabilities across diverse educational attainment levels and socioeconomic settings. The broader implications of these results suggest that educational policy and school administration should move beyond basic digital training targeted at specific demographic subgroups. Instead, professional development programs should focus on advanced pedagogical strategies—such as AI-assisted instructional design, adaptive learning pathways, and deep curriculum integration—benefiting the entire teaching force regardless of demographic profile.

Table 7

Differences in the Level of Teachers' Digital Instructional Practices in the area of Technology Integration for Instruction when grouped and compared according to variables

Technology Integration for Instruction

Variables	Categories	N	Mean Rank	Mann Whitney U-test	Sig. Level	p-value	Interpretation
Age	Younger	27	39.56	690.00	0.05	0.901	Not Significant
	Older	52	40.23				
Sex	Male	38	38.11	707.00		0.478	Not Significant
	Female	41	41.76				
Highest		25	43.18	595.50		0.400	Not

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Educational Attainment	Lower					Significant
	Higher	54	38.53			
Average Family Monthly Income	Lower	32	40,94	722.00	0.763	Not Significant
	Higher	47	39.36			

The statistical results presented in Table 7 display the comparative analysis of teachers' digital instructional practices in the area of Technology Integration for Instruction when categorized according to demographic and socioeconomic profile variables using the Mann-Whitney U-test at a 0.05 significance level. When grouped according to Age, younger teachers ($N=27$, Mean Rank = 39.56) and older teachers ($N=52$, Mean Rank = 40.23) yielded a U-statistic of 690.00 with a p-value of 0.901, indicating no statistically significant difference ($p>0.05$). For Sex, male educators ($N=38$, Mean Rank = 38.11) and female educators ($N=41$, Mean Rank = 41.76) showed comparable rank scores ($U=707.00, p=0.478$), which is interpreted as Not Significant.

Likewise, when grouped by Highest Educational Attainment, teachers with lower educational attainment ($N=25$, Mean Rank = 43.18) and those with higher educational attainment ($N=54$, Mean Rank = 38.53) recorded $U=595.50$ with a p-value of 0.400, showing no significant variation. Lastly, regarding Average Family Monthly Income, teachers categorized under the lower-income group ($N=32$, Mean Rank = 40.94) and higher-income group ($N=47$, Mean Rank = 39.36) produced a U-statistic of 722.00 and a p-value of 0.763, confirming that the difference is Not Significant.

At the end, in terms of the level of Teachers' Digital Instructional Practices in the area of Technology Integration for Instruction when grouped and compared according to variables, null hypothesis is accepted.

The findings demonstrate that the level of technology integration during actual classroom delivery is uniform across age cohorts, sexes, educational backgrounds, and student socioeconomic groups. This suggests that in classroom execution, digital tools such as interactive presentations, educational media, and learning platforms have become a baseline pedagogical standard rather than a skill reserved for specific demographic profiles. The lack of significant

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differences implies that digital tool adoption in teaching has passed the threshold of demographic inequality, driven largely by post-pandemic institutional normalization, standardized educational technology infrastructure, and widespread professional development mandates.

These findings are strongly supported by modern educational literature; as highlighted by Howard et al. (2021) and Scherer et al. (2021), demographic factors like age and gender no longer significantly predict technology adoption when schools provide equitable access to digital devices and digital learning management platforms. Furthermore, Tondeur et al. (2023) and Santos et al. (2024) observe that institutional expectations and nationwide digital education frameworks have harmonized technology integration across teachers of varying educational attainment and socioeconomic contexts. The practical implication of these findings highlights that school administration, and educational planners should move away from demographically segmented technology training. Instead, institutional capacity-building should focus on domain-specific, advanced digital pedagogies such as subject-tailored interactive simulations, AI-driven adaptive learning, and higher-order digital problem solving offered uniformly to the entire teaching staff.

Table 8

Differences in the Level of Teachers' Digital Instructional Practices in the area of Student Engagement when grouped and compared according to variables

Student Engagement

Variables	Categories	N	Mean Rank	Mann Whitney U-test	Sig. Level	p-value	Interpretation
Age	Younger	27	43.61	604.50		0.310	Not Significant
	Older	52	38.12				
Sex	Male	38	35.18	596.00	0.05	0.071	Not Significant
	Female	41	44.46				
Highest Educational Attainment	Lower	25	45.34	541.50		0.156	Not Significant
	Higher	54	37.53				

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Average Family Monthly Income	Lower	32	41.59	689.50	0.530	Not Significant
	Higher	47	38.67			

Table 8 presents the Mann-Whitney U test analysis comparing the levels of teachers' digital instructional practices in the area of pupils Engagement across demographic and socioeconomic variables, including age, sex, highest educational attainment, and average family monthly income.

For age, younger teachers ($N=27$, Mean Rank = 43.61) reported a slightly higher mean rank than older teachers ($N=52$, Mean Rank = 38.12); however, the difference was not statistically significant ($U=604.50, p=0.310$). Regarding sex, female teachers ($N=41$, Mean Rank = 44.46) exhibited a higher mean rank compared to male teachers ($N=38$, Mean Rank = 35.18), but this difference was likewise not significant at the designated standard threshold ($U=596.00, p=0.071$). The hypothesis earlier stated in the introduction was henceforth accepted.

Similarly, comparisons based on highest educational attainment revealed that teachers with lower educational attainment ($N=25$, Mean Rank = 45.34) did not differ significantly from those with higher educational attainment ($N=54$, Mean Rank = 37.53; $U=541.50, p=0.156$). Finally, no statistically significant difference was observed when grouping teachers by average family monthly income ($U=689.50, p=0.530$), as teachers with lower income ($N=32$, Mean Rank = 41.59) and higher income ($N=47$, Mean Rank = 38.67) performed at comparable levels. Overall, all tested p-values exceeded the chosen significance thresholds ($\alpha=0.05$), indicating no statistically significant differences in teachers' digital instructional practices for student engagement across any of the grouping variables.

Over all, in terms of the Level of Teachers' Digital Instructional Practices in the area of Student Engagement when grouped and compared according to variables, null hypothesis is accepted.

These empirical findings suggest that teachers' implementation of digital instructional practices aimed at driving student engagement is relatively homogeneous, irrespective of individual demographic or socioeconomic profiles. Historically, factors such as age and gender were often perceived as key determinants of digital adoption, with younger educators assumed to possess superior digital fluency. However, the current non-significant results align with contemporary research demonstrating that the general digital divide among educators has narrowed substantially following widespread digital transformations and institutional tech-integration policies (Siddiq & Scherer, 2021).

The lack of significant difference across educational attainment levels and monthly family income further indicates that personal background or academic status does not inherently restrict a teacher's pedagogical ability to engage students digitally. Instead, systemic factors—such as institutional digital infrastructure, standardized school ICT professional development,

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and uniform instructional guidelines—play a far more pivotal role in shaping teaching practices than individual teacher demographics (Chiu, 2021; Tzafilkou et al., 2022). Furthermore, researchers highlight that student-engagement strategies in digital spaces depend primarily on general pedagogical beliefs and tech-self-efficacy rather than demographic traits like age or socioeconomic status (Hwang et al., 2023).

The findings yield critical practical and policy implications for educational administrators, curriculum developers, and professional development coordinators.

First, school leaders should move away from demographic-targeted assumptions such as offering introductory digital training exclusively to older faculty or assuming younger or higher-salaried teachers automatically possess effective digital student-engagement strategies. Instead, professional development initiatives should adopt an inclusive, skill-based framework focusing on advanced pedagogical techniques, collaborative online tools, and interactive digital strategies suitable for all educators regardless of age, sex, background, or rank (Scherer et al., 2021). Second, because demographic variables do not account for variations in digital student engagement practices, future institutional interventions should prioritize institutional equity ensuring all teachers have access to equal technical support, high-speed connectivity, interactive software, and standardized digital resources (Tondo & Sarmiento, 2022). By shifting administrative focus from individual demographic characteristics to system-wide support structures, educational institutions can more effectively promote active,

Table 9

Differences in the Level of Teachers' Digital Instructional Practices in the area of Digital Assessment and Feedback when grouped and compared according to variables

Digital Assessment and Feedback

Variables	Categories	N	Mean Rank	Mann Whitney U-test	Sig. Level	p-value	Interpretation
Age	Younger	27	38.56	663.00	0.05	0.684	Not Significant
	Older	52	40.75				
Sex	Male	38	37.51	684.50		0.349	Not Significant
	Female	41	42.30				
Highest		25	33.46	511.50		0.082	Not

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Educational Attainment	Lower					Significant
	Higher	54	43.03			
Average Family Monthly Income	Lower	32	38.20	694.50	0.562	Not Significant
	Higher	47	41.22			

Table 9 presents the Mann-Whitney U-test results comparing the level of teachers' digital instructional practices in the area of Digital Assessment and Feedback across selected demographic variables: Age, Sex, Highest Educational Attainment, and Average Family Monthly Income. Across all four demographic classifications, the test yielded non-significant differences at the set 0.05 level of significance. Specifically, comparing Age groups (Younger vs. Older) yielded $U=663.00$ $(p=0.684)$, Sex (Male vs. Female) yielded $U=684.50$ $(p=0.349)$, Highest Educational Attainment (Lower vs. Higher) yielded $U=511.50$ $(p=0.082)$, and Average Family Monthly Income (Lower vs. Higher) yielded $U=694.50$ $(p=0.562)$.

Because all p -values exceed the 0.05 threshold, the null hypotheses are retained, indicating that teachers demonstrate statistically comparable levels of practices in executing digital assessments and providing feedback regardless of their age, gender, post-graduate educational status, or socio-economic standing.

The lack of significant difference across Age $(p=0.684)$ challenges traditional digital native–digital immigrant dichotomies, demonstrating that older educators have acquired comparable digital assessment capabilities to their younger counterparts due to continuous professional development and institutional mandates. Similarly, the non-significant variation across Sex $(p=0.349)$ indicates that digital tools for formative and summative feedback are equally accessible and adopted by both male and female teachers without gender-based barriers. The results regarding Educational Attainment $(p=0.082)$ and Family Monthly Income $(p=0.562)$ further underscore that digital assessment practices rely heavily on standard institutional platforms such Learning Management Systems, online quizzes, rubric generators and core pedagogical training rather than an individual teacher's personal economic standing or advanced academic degree status.

Overall, in terms of the Level of Teachers' Digital Instructional Practices in the area of Digital Assessment and Feedback when grouped and compared according to variables, null hypothesis is accepted.

Recent studies demonstrate that mandatory digital transition during and after the pandemic has standardized digital competence among teachers, minimizing traditional demographic gaps in technology adoption (Scherer et al., 2021; Lucas et al., 2021).Amponsah et al. (2024) and Momdjian et al. (2024) observed that gender and age cease to be significant

predictors of ICT integration and assessment execution when educators operate within shared institutional infrastructure and uniform training frameworks. Bearman et al. (2023) and Haleem et al. (2022) highlighted that effective digital assessment and feedback practices are primarily governed by organizational culture, available digital tools, and institutional policy rather than individual socio-economic status or educational background.

School administrators and policymakers should avoid designing digital integration programs based on demographic segmentation targeting only older or less educated teachers). Instead, professional development should focus on advanced pedagogical strategies, such as automated feedback design, authentic e-assessment, and data-driven instruction that benefit all teachers equally.

Conclusion:

The respondents were predominantly mature, post-graduate educators with a monthly family income of Php12,000 or higher and a balanced representation of male and female teachers. Teachers demonstrated a high level of digital instructional practices in digital lesson design planning, technology integration for instruction, student engagement, and digital assessment and feedback, consistently across age, sex, highest educational attainment, and average family monthly income groups. No significant differences were found in any of the four areas when respondents were grouped according to these variables, indicating that digital instructional competencies are broadly and uniformly practiced regardless of demographic characteristics. These findings suggest that teachers possess well-established digital pedagogical skills and that future professional development may focus on advanced innovations, such as AI-supported instruction, digital analytics, and automated assessment, rather than basic digital literacy.

Recommendations:

Based on the conclusions drawn, it is recommended that school administrators and instructional leaders elevate continuous professional development (CPD) programs by shifting from basic computer literacy toward advanced digital pedagogy. Since teachers demonstrate a strong baseline of digital capability across demographic groups, Learning Action Cell (LAC) sessions should emphasize AI-driven instructional tools, learning analytics, adaptive learning platforms, and automated assessment diagnostics. Collaborative professional learning communities should also be established to sustain and enhance consistent standards in digital lesson design and planning, with experienced teachers serving as digital instructional coaches who promote cross-subject resource sharing, creativity, and consistency in technology-enhanced instruction. The consistent lesson planning capabilities of teachers may further be supported through the development of a centralized cloud-based repository at the school or division level for sharing and accessing quality digital instructional resources. Moreover, sustained excellence in instruction, student engagement, and digital assessment should be ensured through continuous investment in modern hardware, software, interactive classroom technologies, and reliable high-speed internet to prevent infrastructure limitations from hindering advanced digital practices. Finally, future researchers are encouraged to examine the relationship between advanced digital

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instructional practices and student learning outcomes, as well as explore the qualitative, ethical, and long-term sustainability aspects of AI integration and digital pedagogy in evolving educational environments.

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