

## **Digital Pedagogy: An Analysis of the Digital Competency Level of Key Stage 2 Teachers and Learners in Selected Philippine Public Elementary Schools**

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### **Abstract**

In the context of the Fourth Industrial Revolution (IR 4.0), digital competency is essential for effective teaching and learning. However, many public elementary schools face challenges such as inadequate infrastructure, limited teacher training, and disparities in digital literacy. These are further complicated by unclear policies and ethical concerns around access and equity. This study addresses a research gap by examining how demographic factors influence digital competencies and exploring the relationship between the digital skills of Key Stage 2 teachers and learners. This study used a descriptive-correlational quantitative design. Data were collected through a standardized questionnaire from “The Digital Competence Questionnaire” and analyzed using descriptive and inferential statistics, Spearman’s Rho, Mann-Whitney U, and Kruskal-Wallis tests. Findings revealed that both groups had moderate digital competencies, with key stage 2 learners slightly outperforming teachers in information processing and safety. A very weak, non-significant correlation was found between key stage 2 teachers and learners’ digital competencies. Among teachers, digital skills varied significantly by gender and age, whereas learners’ competencies were influenced by technology access but not by gender. These results highlight the need for targeted teacher training, equitable access to digital tools, and policy reforms that promote digital citizenship. The study offers practical insights for fostering an inclusive, humanistic digital learning environment. Specifically, the study recommends to enhance Continuous Professional Development (CPD) for Teachers, integrate digital literacy into the curriculum, establish Mentorship and Peer Learning Programs, adopt gender-inclusive training strategies, implement regular digital competency assessments.

### **Keywords**

Age, digital competencies, gender, key stage 2, teachers

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## Introduction

In today's digital era, strong digital skills are vital for education, employment, social inclusion, and safe technology use. Schools face challenges in data security due to limited infrastructure, insufficient teacher training, and weak policies, heightening vulnerability to cyber threats (Magalhães et al., 2024). As digital natives, students require thoughtful technology integration to enhance learning while avoiding risks such as cognitive overload (Hämäläinen et al., 2021; Bedenlier et al., 2020). Effective digital classrooms depend on teachers' skills, attitudes, resources, and demographics such as gender (Hamilton & Hattie, 2021). Teachers' confidence in managing online instruction shapes engagement and achievement, influencing the success of technology integration (Javaid et al., 2022). DepEd Order No. 31, s. The 2012 K to 12 curriculum prescribes the Key Stage 2 curriculum, including digital competencies in data management, web navigation, word processing, and multimedia creation. Digital tools further enhance critical thinking, problem-solving, communication, and research, improving performance in mathematics, science, and reading (Quimpan & Bauyot, 2025).

A persistent challenge is the digital literacy gap between students and educators, which increases the risk of fraud and cyberbullying (Djalalov, 2023). Civic education equips learners to navigate digital spaces safely, emphasizing rights and responsibilities (Widiana et al., 2024). Technology integration also raises ethical concerns of equity and access, which can reinforce disparities (Djalalov, 2023). Educators must therefore foster digital citizenship, guiding students to act responsibly and ethically online (Widiana et al., 2024).

This study examines demographic profiles and digital competencies of Key Stage 2 teachers and learners across information, communication, content creation, safety, and problem-solving. It explores relationships between skills and demographic factors to guide leaders in addressing gaps and promoting humanistic digital pedagogy. Findings aim to support initiatives that strengthen digital literacy, ensuring emerging technologies serve as tools of empowerment rather than barriers. Unlike prior studies focusing only on teachers or learners, this study uniquely compares both groups within the same school context, offering a holistic perspective that reveals alignment, gaps, and opportunities for targeted capacity-building.

## Research Questions

The general problem of this study is to determine how key stage 2 teachers' and learners' digital competencies influence digital pedagogy. Specifically, the study aims to examine the demographic profile of key stage 2 teachers in terms of gender and age, as well as the demographic profile of key stage 2 learners in terms of gender and availability of technological tools. It also seeks to assess the level of digital competencies of both teachers and learners with respect to information, communication, content creation, safety, and problem-solving. Furthermore, the study investigates whether there is a significant relationship between the digital competency levels of key stage 2 teachers and learners, and whether significant differences exist between teachers' demographic profiles and their digital competency skills, as well as between learners' demographic profiles and their digital competency skills.

## Methodology

This research used a non-experimental, descriptive-correlational quantitative design to assess the digital competencies of Key Stage 2 teachers and learners and to investigate any existing relationships or differences across demographic factors such as gender, age, and experience.

The core instrument used was an adapted questionnaire by Khateeb (2017), which previously demonstrated excellent reliability (Cronbach's  $\alpha = 0.9013$ ). In the current study, the instrument demonstrated acceptable reliability ( $\alpha = .759$ ). This survey, administered via Google Forms, measures five sequential areas of digital competence: Information Processing (IP), Communication (Com), Content Creation (ConCre), Safety (Safe), and Problem Solving (PS).

The sample consisted of 15 teachers and 214 learners in Grades 4-6, selected through stratified sampling; parental consent was obtained to ensure all learners participated. Descriptive statistics used frequency, mean, and SD, while non-parametric inferential tests used Spearman's Rho, Kruskal-Wallis, and Mann-Whitney U since the data were verified to be non-normally distributed through a Shapiro-Wilk Test. The study strictly followed the ethical guidelines set by international standards, including informed consent, confidentiality, and data protection, in line with standards such as GDPR.

## Results and Discussion

In line with the objectives of this research, this section presents the detailed results derived from the validated research instruments, structured according to the stated research questions. Using appropriate statistical analyses, the findings are interpreted, organized, and discussed accordingly.

Table 1. The Demographic Information Of The Teacher – Respondents

Demographics	Description	Frequency	Percentage
Gender	Male	3	20%
	Female	12	80%
	<b>Total</b>	<b>15</b>	<b>100%</b>
Age	20-30	3	20%
	30-40	7	46.7%
	40-50	4	26.7%
	50-60	1	6.7%
	<b>Total</b>	<b>15</b>	<b>100%</b>

Table 1 shows the demographics of the 15 teacher respondents, with 80% female, reflecting trends in elementary education (Suminar et al., 2024). Most were mid-career professionals, aged 30–50, with 7–25 years of teaching experience, indicating substantial expertise and professional maturity. Their backgrounds support reliable insights into instructional leadership, digital competencies, and continuous professional development (Alimjonovna, 2024).

Table 2. The Demographic Information Of The Key Stage 2 Learner-respondents

Demographics	Description	Frequency	Percentage
Gender	Male	109	50.9%
	Female	105	49.1%
	<b>Total</b>	<b>214</b>	<b>100%</b>
Availability of Technological Tools	Desktop	14	6.5%
	Laptop	14	6.5%
	Cellphone	181	84.6%
	Tablet	5	2.3%
	<b>Total</b>	<b>214</b>	<b>100%</b>

Table 2 shows the demographics of 214 intermediate learners. Balanced gender supports unbiased analysis, though ICT preferences differ by gender (Peláez-Sánchez & Glasserman-Morales, 2023; Yaokumah et al., 2019). Most students (84.6%) rely on smartphones, which may limit their ability to perform advanced digital tasks and raise equity concerns. These findings highlight the need for inclusive educational strategies that align with the devices students commonly use (Ružić-Baf et al., 2023).

Table 3. The Level Of Digital Competencies Of Key Stage 2 Teachers

Competency Area	Weighted Mean	Standard Deviation	Verbal Interpretation
Information Processing	2.44	0.72	Disagree
Communication	2.57	0.62	Agree
Content Creation	2.68	0.47	Agree
Safety	2.51	0.65	Agree
Problem Solving	2.63	0.51	Agree
<b>Overall Mean</b>	<b>2.57</b>	<b>0.59</b>	<b>Agree</b>

Table 3 presents the level of digital competencies of key stage 2 teachers. The findings imply the importance of implementing targeted professional development programs that address specific areas of weakness, especially in information literacy. The DigCompEdu framework identifies key competencies necessary for effective technology integration, including the use of educational applications and virtual collaboration (Vanegas et al., 2025). However, studies indicate that teachers often possess an intermediate level of digital competence, underscoring the need for targeted training to bridge existing gaps (Díaz et al., 2025). Strengthening teachers' digital competencies across all key domains is crucial not only for successfully integrating technology into classroom instruction but also for equipping students with the skills they need to thrive in an increasingly digital educational landscape. The focus is on enhancing digital competencies; it is also important to consider the broader educational environment. Challenges such as varying levels of digital proficiency among educators and the need for continuous professional development must

be addressed to ensure both teachers and students can thrive in a digital age (Yadav, 2024). Blended learning models and professional learning communities (PLCs) are effective strategies for integrating technology with pedagogy. Moreover, personalized learning pathways and ongoing support are crucial for fostering both technological fluency and pedagogical mastery (Napitupulu et al., 2024).

Table 4. The Level Of Digital Competencies Of Key Stage 2 Learners

Competency Area	Weighted Mean	Standard Deviation	Verbal Interpretation
Information Processing	2.96	0.42	Agree
Communication	2.84	0.47	Agree
Content Creation	2.78	0.47	Agree
Safety	2.96	0.49	Agree
Problem Solving	2.88	0.43	Agree
<b>Overall Mean</b>	<b>2.88</b>	<b>0.46</b>	<b>Agree</b>

Table 4 shows the level of digital competencies of key stage 2 learners. The findings highlight the need to strengthen digital literacy, with a focus on communication and content creation. Self-regulated learning strategies, such as metacognition, resource management, and motivation, significantly influence digital skills (Anthonysamy et al., 2020). Policies, curriculum integration, and teacher training further enhance productive and creative technology use (Kasimbara, 2024). Blended and flipped learning approaches support personalized, active, and engaging digital learning (Basri, 2024; Díaz et al., 2025).

Table 5. Significant Relationship Of Key Stage 2 Teachers and Learners In Terms Of their Digital Competencies

Variables	$\rho$	Description	p-value	Decision	Interpretation
Information Processing	-0.068	Very Weak	0.323	Do not Reject Ho	There is no significant relationship.
Communication	-0.007	Very Weak	0.916	Accept Ho	There is no significant relationship.
Content Creation	0.017	Very Weak	0.800	Accept Ho	There is no significant relationship.
Safety	-0.099	Very Weak	0.150	Accept Ho	There is no significant relationship.
Problem Solving	-0.085	Very Weak	0.213	Accept Ho	There is no significant relationship.
<b>Overall Digital Competency</b>	<b>-0.030</b>	<b>Very Weak</b>	<b>0.659</b>	<b>Accept Ho</b>	<b>There is no significant relationship.</b>

Table 5 shows a significant relationship between key stage 2 teachers and learners regarding their digital competencies. The data accentuates the need within digital pedagogies to go beyond basic digital skills. Teachers with better digital training create better learning

environments (Morejoń et al., 2024). However, many teachers still lack sufficient digital skills; thus, the need for ICT training and support cannot be ignored (Alzakwani et al., 2025). For effective digital teaching, integrating tools into the pedagogy is more important than technical proficiency. These weak correlations suggest that instructional design, teaching methods, student engagement, and learning contexts may play a greater role. In-service training for teachers using a digital pedagogy curriculum significantly enhances their competencies (Bentri & Hidayati, 2023).

The TPACK framework provides a sound basis for integrating technology; however, disparities between self-reported assessments and practice persist among teachers. Future studies need to be conducted to develop more effective tools for proper assessments and training. Professional development can enhance teachers' TPACK, which, in turn, will enhance their lesson design and technology-use skills (Li et al., 2024). However, self-reported TPACK often exceeds demonstrated practice, revealing a gap between perceived and actual competencies (Karakaya, 2017).

Table 6. Significant Difference Between The Key Stage 2 Teachers' Gender and Digital Competency

Variables	Mann-Whitney U	P-Value	Decision	Interpretation	$\eta^2$ Value	Effect Size
Information Processing	9.000	0.158	Accept Ho	There is no significant difference	0.6786	Moderate
Communication	9.500	0.204	Accept Ho	There is no significant difference	0.6607	Moderate
Content Creation	4.000	0.036	Reject Ho	There is a significant difference	0.8571	Large
Safety	4.000	0.028	Reject Ho	There is a significant difference	0.8571	Large
Problem Solving	4.000	0.037	Reject Ho	There is a significant difference	0.8571	Large
<b>Overall</b>	<b>4.000</b>	<b>0.041</b>	<b>Reject Ho</b>	<b>There is a significant difference</b>	<b>0.8571</b>	<b>Large</b>

Table 6 describes gender-related differences in teachers' digital competencies by using the Mann-Whitney U test. Gender-related factors may shape how teachers engage with digital technologies, especially in areas that require technical proficiency, creativity, and problem-solving, such as content creation and safety. The cause of these disparities could be unequal opportunities in training and resources, as well as social norms. Research shows that gender is one of the main factors in digital teaching competence, and that there are different patterns in technology adoption and use among male and female teachers. Gender-sensitive training is

recommended to enhance teachers' digital skills and foster more inclusive learning environments (Moreno-Guerrero et al., 2019). Furthermore, gender-based training is recommended to support teachers in developing their technology skills, promoting more inclusive and effective learning environments (Halimatussakdiah et al., 2024).

Table 7. Significant Difference Between The Key Stage 2 Teachers' Age and Digital Competency

Variable	Kruskal–Wallis H	p-value	Decision	Interpretation	$\eta^2$ Value	Effect Size
Information Processing	7.277	0.064	Accept $H_0$	There is no statistically significant difference	0.3888	Moderate
Communication	5.477	0.140	Accept $H_0$	There is no statistically significant difference	0.2252	Small
Content Creation	5.074	0.166	Accept $H_0$	There is no statistically significant difference	0.1885	Small
Safety	4.417	0.220	Accept $H_0$	There is no statistically significant difference	0.1288	Small
Problem Solving	4.303	0.231	Accept $H_0$	There is no statistically significant difference	0.1185	Small
<b>Overall</b>	<b>7.945</b>	<b>0.047</b>	<b>Reject <math>H_0</math></b>	<b>There is a statistically significant difference</b>	<b>0.4495</b>	<b>Moderate</b>

Based on Table 7, the findings are similar to those of Sánchez et al. (2020), suggesting that age influences overall proficiency, with younger teachers generally showing higher digital competence. Furthermore, individual skills appear consistent across age groups; variations in overall competency may reflect differences in confidence, adaptability, and the ability to integrate skills, shaped by generational exposure and experience. These results highlight the need for tailored professional development that addresses age-related differences in digital confidence and adaptability to strengthen teachers' competencies (Mahat, 2024).

Table 8. Significant Difference between the Key Stage 2 Learners' Availability of Technology and Digital Competency

Variables	Kruskal–Wallis H	p-Value	Decision	Interpretation	$\eta^2$ Value	Effect Size
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Information Processing	7.402	0.060	Accept Ho	There is no significant difference	0.02096	Very Small
Communication	13.231	0.004	Reject Ho	There is a significant difference	0.04872	Small
Content Creation	8.729	0.033	Reject Ho	There is a significant difference	0.02728	Very Small
Safety	7.675	0.053	Accept Ho	There is no significant difference	0.02226	Very Small
Problem Solving	3.081	0.379	Accept Ho	There is no significant difference	0.00039	Negligible
<b>Overall</b>	<b>11.463</b>	<b>0.009</b>	<b>Reject Ho</b>	<b>There is a significant difference</b>	<b>0.04030</b>	<b>Small</b>

Based on Table 8, this analysis explored how access to technology influences learners' digital competencies using the Kruskal-Wallis H test. It implies that access to technology has a more targeted impact on certain digital skills. Students' digital competence levels increase with the duration of their use of technological devices and their technology-use competence (Yildirim et al., 2024). Furthermore, educational software, educational platforms, and social networks can be valuable tools for students in learning and the acquisition of competencies, as long as they are used responsibly and critically (Chávez-Márquez et. al., 2023).

## Conclusion

The study found that Key Stage 2 teachers and learners have moderate digital competencies; learners outperformed teachers. Teachers scored high on content creation and problem-solving tasks but were weak in information processing. At the same time, learners were stronger in information processing and safety but weaker in communication and content creation. According to the demographic analysis, gender influenced certain areas of teachers' competence, while age influenced their overall proficiency: the younger the teachers, the higher their competence. The number of years of service and subject taught did not have a significant impact. For learners, gender did not affect results, but access to technology strongly influenced communication, content creation, and overall competency.

Most importantly, no significant relationship was observed between teachers' and learners' competencies, suggesting a limitation to knowledge transfer. The current results highlight a continuous need for digital skills training, the incorporation of digital literacy into the curriculum, and equal access to technology. However, the small sample size, narrow geographic area, and cross-sectional study design limit generalizability and insight into long-term changes. Future



studies should utilize longitudinal designs with larger, more diverse samples to better inform targeted interventions and policy.

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