International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Competence and Challenges in Technology-Driven Instruction in Basic Education

Lyndierose U. Orbigoso[1], Pepa V. Pontillas[2]

[1,2]Researcher, Cagayan de Oro College - PHINMA Education

Abstract

With the growing integration of technology in education, teachers must adapt their instructional strategies to effectively use digital tools. This study examined the pedagogical competence and challenges faced by elementary teachers in the Schools Division of Camiguin during SY 2023–2024. Specifically, it aimed to identify teachers' profiles, assess their competence in technology-driven instruction, determine the extent of challenges encountered, examine the relationship between competence and challenges, identify differences in challenges based on teachers' profiles, and propose an ICT development plan. Using a descriptive correlational design and purposive sampling, 305 public elementary teachers from five districts participated. Modified questionnaires and statistical tools such as mean, standard deviation, Pearson correlation, and ANOVA were used for data analysis. Findings revealed that teachers are generally competent in using technology in instruction, but they still face notable challenges in its effective and sustained use. A significant relationship exists between competence and challenges in areas such as technology operations, instructional design, content development, and management skills, but not in pedagogical competence alone. Furthermore, challenges significantly vary by position, education, experience, and perception, but not by grade level taught. Based on the results, the Teacher-Centered Digital Adaptability Theory was developed, emphasizing teacher empowerment, adaptability, and sustained support in technology-driven teaching. The study recommends that teachers actively join training programs, explore technology-based strategies, and guide students in using digital tools while collaborating with peers to improve their digital competence and confidence.

Keywords: competence, challenges, technology-driven instruction

Introduction

National authorities and global organizations have emphasized the need to expand the use of Information and Communication Technologies (ICT) in schools and universities over the past few decades (Roztocki et al., 2019; Mtebe, 2020). Globally, nine key concepts for the future of education as the cornerstone of society are included in the 2019 report by UNESCO's International Commission on the Future of Education, which was established based on the 2030 Agenda for Sustainable Development. Ensuring that everyone has equal access to high-quality education at all educational levels is just one goal; another is to make sure that everyone is educated equally and from an inclusive, egalitarian, and fair perspective (Cervera & Caena, 2022). These new guidelines cover everything from guaranteeing that education is a public benefit with equitable chances to providing adequate funding to make this feasible. They also emphasize the significance of qualified teachers by providing the best possible environment for their

professional growth. To guarantee educational equity, this is insufficient given the features of the digital society regarding inclusion and exclusion (Ragnedda et al., 2022).

To close the digital divide, the Philippines has not yet stopped offering digital literacy initiatives. Teachers, students, and administrators are only somewhat prepared for e-learning, according to her research. However, further research is needed to determine how learning platforms are used and how capable teachers are in the Philippines when it comes to digital technology. It motivated the researcher to investigate teacher digital literacy and competency as well as the variables influencing the growth of these skills in the basic education. Furthermore, there are not many resources available regarding the phenomenon that is currently being studied. Therefore, the proponent thinks that to successfully overcome these challenges and to be better equipped with digital knowledge and abilities about its application in our classrooms, teachers need to become proficient in technology now (Highland & Fedtke, 2023; Onu et al., 2023).

Henceforth, this study assessed the level of ICT competence and challenges encountered on technology-driven instruction in basic education among the public elementary school teachers in the Schools Division of Camiguin. It aims to address three research inquiries about teachers' competency and challenges in incorporating educational technology into teaching and learning. The outcomes of this research inquiry would offer a perspective on pedagogical competence and challenges among elementary school teachers. The results of the study were utilized in creating an improved school Information and Communication Technology (ICT) development plan.

Literature Review

Respondent Profile

The study's respondents came from different backgrounds, including variations in age, teaching level, position, highest educational attainment, and years of teaching experience.

Grade Level Taught

According to the study of Rahiem (2021), the use of ICT varies across different grade levels, depending on the learners' needs and developmental stages. In Kindergarten, teachers use educational videos, interactive storytelling apps, and digital games to introduce basic concepts in a fun and engaging way. Alsaleh (2020) further emphasized that these tools help develop early literacy, numeracy, and motor skills while keeping young learners motivated. In elementary levels, ICT is often used for multimedia presentations, online quizzes, and research activities, fostering independent learning and critical thinking skills among students.

Position

Teachers with higher positions provide them with a thorough awareness of numerous technology tools and their applications in educational settings. This gathered knowledge enables them to effectively integrate technology into their teaching practices while adapting to changing educational technology trends.

Conversely, lower-level teachers may prioritize familiarizing themselves with basic technological tools and innovating their teaching approaches. Novice teachers, or those in lower positions, often receive assistance from more experienced colleagues. For example, Gomez et al. (2022) observed that teachers with higher positions support technical teachers struggling with technology integration in the teaching and learning process. This collaborative dynamic allows for knowledge exchange and mentorship, ultimately enhancing technological proficiency among educators at all levels.

Highest Educational Attainment

Teachers who have not pursued professional studies may encounter challenges when integrating technology into teaching-learning due to their lack of experience. They continuously strive to improve their competency in utilizing technology in the classroom. Mendoza (2022) study revealed that these teachers are constantly immersing themselves in the world of technology to adapt.

On the other hand, Lucas et al. (2021) discovered that teachers with the highest educational attainment demonstrate a high level of competency in using technology. This is attributed to the fact that these teachers have undergone professional studies and have acquired innovative strategies for integrating technology into teaching and learning.

Teaching Experience

Teachers have demonstrated their preparedness to integrate technology into their classrooms based on various factors such as their extensive teaching experience, background in technology use, and practical exposure to its application. For instance, Sagocsoc's research revealed that educators with considerable teaching experience are more inclined to incorporate technology into their teaching practices. They adapt to the evolving educational landscape and recognize technology as a practical tool for enhancing student performance.

Perception towards ICT Driven-Instruction

According to the study of Akhram et al., (2022), teacher perceptions are considered a significant predictor of technology integration. However, these perceptions can also hinder ICT integration . For example, a teacher might view the open nature of certain technological solutions as pedagogically inappropriate, preferring direct instruction as the most effective teaching method.

ICT Competence

Based on the study of Gess-Newsome et al., (2019), pedagogical competencies pertain to teachers' instructional techniques and understanding of the curriculum. It necessitates the development of technology-integrated applications within their respective disciplines to enhance teaching and learning. Moreover, Rice & Mars (2023) emphasized that these competencies encompass various aspects such as student learning, classroom management, lesson planning, implementation, and student assessment. They involve understanding appropriate classroom techniques, the characteristics of the student audience, and methods for assessing student comprehension.

Operation and Concept

Based on the study of Tooker (2020), the Technology Operations and Concepts (TOC) competence equips teachers with the knowledge, skills, and understanding necessary to keep pace with 21st-century learners through the use of technology systems, resources, and services. The study of Takur (2015) further emphasized that TOC provides ongoing support and education essential for fostering technological growth in the classroom, making it vital for teachers in the teaching and learning process as it enhances effective learning. It also helps students further develop and achieve learning outcomes while maintaining the context of designing classroom-based resources using ICT. Therefore, acquiring knowledge and competence in technology operations and concepts is crucial for teachers.

Pedagogy

A study of Mokhetsengoane & Pallai (2023) emphasized that teaching in the 21st century era is more dynamic than before. Notably, the emergence of technology in education has radically transformed the pedagogical practices of teachers in the 21st century.

According to the study of Fernández-Gutiérrez et al., (2020), teaching and learning process has evolved significantly in recent years due to the changing dynamics of the classroom. Over the past three decades, there has been substantial investment in technology tools and resources in schools, necessitating that teacher effectively incorporate technology into teaching and learning. Consequently, the skills required of 21st-century teachers have also transformed. The focus has shifted from debating whether ICT should be used in the classroom to exploring how it can enhance teaching and learning.

Innovative Instructional Design

Teachers need to move beyond using it to reinforce traditional pedagogies and instead innovate their instruction with it. Since ICT lacks a pedagogical philosophy or content basis, it often does not occur to teachers to use it innovatively. Consequently, teacher education programs for technology integration have been developed worldwide like in the United States, Japan, and Finland. Research has primarily examined the effects of these programs on teachers' knowledge, attitudes, and beliefs about technology integration, based on the technological pedagogical and content knowledge framework. This framework proposes that effective use of technology requires complex forms of teacher knowledge that integrate content, pedagogy, and technology (Birisci & Kul, 2019; Farjon et al., 2019; Wilson et al., 2020). However, little attention has been paid to teachers' ability to use ICT to innovate instruction.

Challenges in Technology-Driven Instruction

Based on the study of Ibrahim et al., (2024), as technology becomes increasingly prevalent in K to 12 education, numerous educators grapple with its integration into their classrooms and ponder its suitability for their teaching practices. Factors such as cost, user-friendliness, and the availability of ongoing support to ensure proficient utilization are crucial considerations that influence decisions regarding the adoption, timing, and extent of new technological tools.

School ICT Facilities

Various research studies have highlighted several reasons for the lack of access to technology in schools. In the study of Aini et al. (2019), teachers complained about the difficulty of consistently accessing computers. Reasons included the need to book computers in advance, which teachers often forget to do, or the inability to book them for multiple consecutive periods needed for projects. In essence, teachers frequently lacked access to ICT materials because these resources were shared among teachers. According to Liesa-Orús et al. (2020), the inaccessibility of these resources is not always due to the mere absence of hardware and software or other technology-based materials within the school. It can also result from factors such as poor resource organization, poor-quality hardware, inappropriate software, or lack of personal access for teachers.

Technology Adaptability

According to Sanchez-Carillo et al., (2021), the utilization of technology in education is not merely a checklist of tasks assigned by institutional leaders; it requires a committed effort to promote sustainable learning and technology adaptation, making it an academic priority. Mercader & Gairín (2020) further emphasized that unpreparedness for rapid technological changes highlights an inability to stay oriented toward the flow of information. Some teachers view technology as a career barrier.

Students' Adaptability

Previous related studies (Rana & Rana, 2020; Venketsamy & Hu, 2022) have established the significant barriers faced by most rural students in the adoption and implementation of ICTs in education. The

researchers highlight the lack of ICT infrastructure, ICT knowledge, ICT training, and the lack of time to implement ICTs in the classroom as factors that hamper the success of ICT adoption in education.

A recent study by Aruleba et al. (2022) identifies three main factors affecting the adoption of ICTs by South African rural students: technology, socioeconomic status, and politics. Similarly, SEACOM (2022) notes that in South Africa and across the continent, digital innovation is driving social and economic change. Evolving connectivity in ICT is helping South Africa address its socioeconomic challenges related to technologies. Meanwhile, a study by Palvia et al. (2018) examined the perspectives of citizens in developing countries, linking technology-driven initiatives with socioeconomic development.

Sustainability

Technological innovations, particularly information and communication technologies, have already been integrated into education and EFS (Education for Sustainability), serving as enablers of rich contexts for interactions between learners and as flexible, dynamic, technology-enhanced personalized learning systems. According to Kozlova and Pikhart (2021) ICTs have been shown to increase connectivity between students and instructors and among students themselves. They enhance the exploitation of shared resources in learning repositories. Whiteside et al. (2023) argued that social presence improves learning performance in academic contexts.

Statement of the Problem

This study aimed to determine the level of ICT competence and challenges in technology – driven instruction in basic education among public elementary school teachers in the Division of Camiguin for School Year 2023-2024. The result of the study was used as the basis for an improved school ICT Development Plan.

Specifically, it sought to answers the following questions:

1. What is the respondents' profile in terms of grade level taught, position, highest educational attainment, teaching experience and perception towards ICT driven instruction?
2. What is the level of teachers' ICT competence on technology operations and concept, pedagogy, innovative instructional design, content development and management skills?
3. What is the level of the teachers' challenges on Technology-Driven Instruction with regards to school ICT facilities, technology adaptability, students' adaptability, and sustainability?
4. Is there a significant relationship between the teachers' ICT competence and their challenges on technology-driven instruction?
5. Is there a significant difference in the teachers' challenges on technology-driven instruction when grouped according to their profile?
6. What improved school ICT Development Plan can be formulated based on the findings of the study?

Methodology

Research Design

This study utilized a descriptive correlational research design to examine the relationship between teachers' ICT competence and their challenges in technology-driven instruction. The descriptive method gathered information on teachers' technological skills and the difficulties they encountered in integrating ICT into their teaching, while the correlational aspect determined whether a significant relationship existed between ICT competence and these challenges. This design provided a clear and systematic way to assess the extent of teachers' ICT skills and identify patterns in their experiences with technology integration.

Surveys and other data collection methods captured a comprehensive picture of teachers' perceptions, competencies, and barriers to using technology in the classroom.

Study Setting

The study was conducted in the Division of Camiguin. It is one of the small Divisions of DepEd Region X. However, today, the student population is growing. As part of its transition to being a medium division, the five original districts were divided into ten districts: Catarman 1 and 2, Sagay, Mambajao 1, Mambajao 2, Mambajao 3, Mambajao 4, Guinsiliban and Mahinog 1 and 2. Some of the schools are situated uphill, near the coastline and highway. These schools are in municipalities with good economic activities and have strong community stakeholders' support.

The Division of Camiguin is categorized as a small division in Region X. There are 66 schools of the Division of Camiguin, which are complemented with 1,237 teaching personnel and 114 non-teaching personnel catering to 25,594 learners. It is located in Lacas, Poblacion, Mambajao, Camiguin composed of various rural elementary and high schools for both Junior and Senior High Schools. The division is headed by the Schools Division Superintendent and Assistant Schools Division Superintendent.

Research Respondents

The study involved three hundred five (305) public elementary school teachers from the Division of Camiguin. These teachers currently teach in the selected schools, which are categorized as medium and small schools based on their quantity. These respondents handled learners from Grades 1 to 6, while Kindergarten teachers were excluded from the study. Kindergarten teachers were excluded due to the nature of their instructional approach, which heavily relies on play-based and tactile learning methods rather than technology-driven instruction. ICT integration is minimal at this early learning stage, as young learners primarily engage in hands-on activities to develop foundational skills.

Table A displays the distribution of respondents by district and schools of the Division of Camiguin.

Table A
Distribution of Respondents

District	Grade Level						Respondents
	G1	G2	G3	G4	G5	G6	
Catarman District	14	15	15	15	16	23	98
Mahinog District	5	5	5	5	5	7	32
Guinsiliban District	3	3	2	2	2	2	14
Sagay District	8	8	8	8	8	11	51
Mambajao District	15	15	15	19	19	27	110
Total	**45**	**46**	**45**	**49**	**50**	**70**	**305**

Sampling Technique

The study employed purposive sampling, selecting Grades 1 to 6 teachers as respondents to ensure the data directly aligned with the research objectives. This method was chosen to focus on teachers actively engaged in technology-driven instruction, as they possess relevant experiences and insights essential to

addressing the research questions. By deliberately selecting respondents, the study ensures both precision and inclusivity in capturing teachers' perspectives on technology integration.

Research Instrument

A patterned and modified questionnaire was utilized to gather data for the study. For the ICT perceptions Towards ICT-Driven Instruction, it was patterned from the study of Jael (2023), titled "Utilization of Multimedia and Academic Performance Among Pupils: Basis for Action Plan" and for the pedagogical competence, it was anchored on the study of Mariscal et al. (2023), titled "Pedagogical Competence towards Technology-Driven Instruction on Basic Education". The Challenges on technology-driven instruction, the questionnaire was anchored from the study of Arnado and Aviles (2023), titled "ICT Integration in IPEd Schools: Challenges and Skills of Intermediate Teachers and Learners". The indicators of pedagogical competence were adapted and modified to fit the local context and research objectives of the study.

Consequently, the survey questionnaire consisted of three parts, the first part is the questionnaire that dealt with the demographic profile of the respondents such as grade level taught, position, highest educational attainment, teaching experience and perception towards ICT driven instruction. The second part of the questionnaire is the level of pedagogical competence in technology-driven instruction with the technology operations and concept pedagogical, innovative instructional design, content development, and management skills. Each sub-variable consists of ten (10) indicators in statement forms. The third part is the questionnaire that covered the extent of the challenges encountered in Technology - Driven Instruction with regards to school ICT facilities, technology adaptability, students' adaptability, and sustainability. Each sub-variable consists of ten (10) indicators in statement forms.

Validity and Reliability of Instrument

After formulating the research instrument, for content validation, the researcher asked for assistance from some experts on the subject matter. These experts were two Master Teachers and one School Head. The content of the research instrument was rated by the validators using the rubric for validating questionnaires. The responses of the validators guided the finalization of the survey questionnaire indicators. Each indicator was carefully reviewed for appropriateness in the local context, grammar, and content. Minor revisions were made to enhance clarity and relevance. The researcher retrieved the validated instrument after a week and then consulted another expert to consolidate the results.

Based on the consolidated evaluation, certain items or indicators were modified or refined to better align with the study's objectives and ensure they accurately measured both the independent and dependent variables. Meanwhile, items that met the required standards for clarity and correctness remained unchanged. The expert issued a Certificate of Content Validity, certifying that the questionnaire had been thoroughly reviewed, analyzed, and evaluated for accuracy and relevance.

After integrating the feedback and recommendations from the identified experts, a pilot test was conducted by administering the survey questionnaire to 30 elementary teachers from Guinsiliban District. Specifically, they come from Liong Elementary School, Butay Elementary School, Maac Elementary School, and Cantaan Elementary School. These teachers, selected from the Division of Camiguin, shared similar characteristics with the actual respondents but were not included in the main study.

After the pilot testing, the test was subjected to a reliability test using Cronbach's Alpha which resulted in an alpha value of 0.96. Alpha values of 0.65-0.80 or higher in many cases indicate an acceptable level of reliability (Goforth, 2015). Hence, this suggests that the instrument is suitable for use in the actual survey.

Data Gathering Procedure

When the researcher's proposal was approved, the researcher prepared a consent letter that was noted by the Dean of the School of Graduate and Professional Studies and was forwarded to the Office of the Schools Division Superintendent of DepEd-Camiguin asking permission to conduct a study in all elementary schools of SDO Camiguin. As the approval was granted, the researcher also asked permission from the District In-Charge to conduct the study in the schools of the concerned district and asked for assistance in gathering the data from the respondents.

To gather data, the researcher utilized a survey questionnaire, ensuring respondents' confidentiality by including a consent letter. The questionnaire was personally distributed to participants, followed by a Focus Group Discussion (FGD) to gain deeper insights. An FGD is a structured discussion where a small group of participants share their experiences, challenges, and perspectives on a specific topic.

For this research, the FGD was conducted during lunchtime to ensure minimal disruption to class schedules. The researcher obtained prior permission from the school principal to facilitate the session smoothly. Participants were selected from nearby schools, ensuring that all grade levels from Grade 1 to Grade 6 were well represented. A guided set of questions was used to lead the discussion, allowing participants to share their thoughts based on the quantitative data gathered in the study. After data collection, the researcher carefully organized, recorded, and analyzed the responses to ensure a comprehensive interpretation of the results.

Statistical Treatment of Data

The fundamental characteristics of the data in a study were described using descriptive statistics. To determine the level of teachers' competence and challenges encountered in technology - driven instruction, weighted mean and standard deviation were employed. To determine the significant relationship between the level of teachers' competence and the level of challenges in technology-driven instruction, the Pearson product-moment correlation coefficient was employed and to test the significant difference in the teacher's challenges encountered in Technology - Driven Instruction when grouped according to their profile, F-test and T-test were utilized.

Ethical Considerations

The researcher followed proper protocol in the conduct of the study. The researcher secured an ethical clearance from the review board. After the recommendation of the Graduate School Administration, communications were made to the Schools Division Superintendent to ask for approval to conduct the study. When the permission was granted, another letter was sent to district supervisors, the district in charge, and the respective school principals of each elementary school. Then, for ethical consideration, a consent letter was sent to the individual participant asking for their approval.

The researcher personally met the participants and gave instructions on how to complete the questionnaire, and the assurance of the confidentiality of their responses. Then, the questionnaires were distributed to the participants giving them enough time to answer. The researcher then gathered the accomplished questionnaire in person for 100 percent retrieval. The researcher had set a separate schedule to conduct

the interview. The researcher listed down all the participants' responses to validate the proposed action plan.

Results and Discussion

Problem 1. What is the respondents' profile in terms of grade level taught, position, highest educational attainment, teaching experience and perception towards ICT driven instruction?

Table 1
Distribution of Respondents' Profile in Terms of Grade Level Taught

Category	Frequency	Percentage
Grade 6	65	21.31
Grade 5	54	17.70
Grade 4	49	16.07
Grade 3	44	14.43
Grade 2	45	14.75
Grade I	48	15.74
Total	**305**	**100.00**

Table 1 displays the distribution of respondents according to the grade levels they teach, with Grade 6 having the **highest** frequency of 65 (21.31%) of the sample. This highest representation of Grade 6 teachers highlights their critical role in preparing students for higher education levels, which is a central focus within the Department of Education (DepEd). This distribution implies that Grade 6 teachers encounter unique challenges due to the academic and developmental milestones associated with this stage, which demands well-planned instructional and assessment strategies.

Conversely, the table shows that Grade 3 teachers have the **lowest** representation, with a frequency of 44 (14.43%) of the sample. This may be because some schools have only a few Grade 3 sections, leading to fewer teachers handling this level. Grade 3 teachers often play a crucial role in strengthening students' foundational skills, particularly in reading, writing, and numeracy. They are typically patient, creative, and skilled in using engaging strategies to support young learners in their transition to more advanced academic concepts. Early-grade teachers, especially those in Grade 3, are instrumental in laying foundational skills, which suggests the need for increased support in terms of resources, training, and professional development specific to early childhood education. This may involve providing teachers with advanced strategies for literacy and numeracy instruction, as well as training in age-appropriate classroom management techniques, to ensure that students build strong foundational skills critical for future learning.

Table 2
Distribution of Respondents' Profile in terms of Position

Category	Frequency	Percentage
Master Teacher II	12	3.93
Master Teacher I	23	7.54
Teacher III	44	14.43
Teacher II	51	16.72
Teacher I	175	57.38
Total	**305**	**100.00**

Table 2 presents the distribution of respondents according to their teaching positions, with the **highest** frequency 175 (57.38%) belonging to Teacher I. This indicates that most of the respondents are in the early stages of their teaching careers or have not yet been promoted to higher positions. According to DepEd Order No. 7, s. 2023, the Teacher I position is the starting point in the teaching career progression. They represent a large workforce in educational institutions, where most teaching staff are in the early stages of their careers. This dominance in frequency suggests that any interventions or reforms within the teaching community should heavily consider the perspectives and needs of Teacher I educators. It also points to a potential opportunity for professional development and career progression strategies aimed at assisting these teachers in advancing to higher positions. This observation suggests a need to focus on improving the qualifications and competencies of Teacher I teachers to enable career growth.

On the other hand, the **lowest** frequency in the table belongs to Master Teacher II, with a frequency of 12 (3.93%) of the total respondents. This can be attributed to specific guidelines set by the Department of Education (DepEd) and the Civil Service Commission (CSC) regarding the allocation of Master Teacher positions. According to DepEd Order No. 57, s. 1997, the total number of Master Teacher positions in elementary schools should not exceed 10% of the total authorized teacher positions in a district. Additionally, Master Teacher I positions are capped at 6.6% of the total authorized teaching positions, while Master Teacher II positions are limited to 3.4% of the number of authorized Master Teacher I positions. These regulations ensure a structured career progression while maintaining balance in teaching positions. The limited number of Master Teacher II posts reflects the strict implementation of these guidelines, which may affect teachers' opportunities for promotion and professional growth. In the context of the Division of Camiguin, a relatively small division within the DepEd framework, the limited number of teaching positions inherently restricts the availability of Master Teacher roles. This scarcity underscores the competitive nature of attaining such positions and highlights the importance of recognizing and nurturing teaching excellence within smaller educational divisions.

Table 3
Distribution of Respondents' Profile in terms of Highest Educational Attainment

Category	Frequency	Percentage
Doctorate Degree	12	3.93
With Doctorate Degree Units	15	4.92
Master's Degree	38	12.46
With Master's Degree Units	137	44.92
Bachelor's Degree	103	33.77
Total	**305**	**100.00**

Table 3 illustrates the respondents' highest educational attainment, where most of them are those with Master's degree units, consisting of the **highest** frequency of 137 (44.92%). It is also notable that some Teacher I respondents already have master's units. This may be because they aim to qualify for promotion to higher teaching ranks in the future, such as Teacher II or III. Additionally, some teachers may have started their postgraduate studies early in their careers to enhance their teaching skills and specialize in a particular subject or stay updated with educational trends. This proactive approach reflects their dedication to lifelong learning and commitment to providing quality education to their learner. Also, this significant

portion indicates that many educators are in the process of pursuing advanced degrees, reflecting a strong motivation for professional growth and career advancement in the education sector.

However, the **lowest** frequency is attributed to those with a doctorate degree, comprising only 12 (3.93%) respondents. This low percentage could indicate that while many teachers aim to pursue graduate studies, few reach the doctoral level, potentially due to factors like the lengthy time commitment, financial constraints, or the limited availability of doctoral programs in their areas. As perceived, this finding suggests the need for policies that encourage and support educators in completing their doctorate degrees, which could lead to more leadership opportunities and higher levels of expertise in the education system.

Table 4
Distribution of Respondents' Profile in terms of Teaching Experience

Category	Frequency	Percentage
21 years above	29	9.51
16-20 years	45	14.75
11-15 years	38	12.46
6-10 years	83	27.21
1-5 years	76	24.92
1 year below	34	11.15
Total	**305**	**100.00**

Table 4 presents the distribution of respondents based on their years of teaching experience, with the **highest** frequency of 83 (27.21%) corresponding to educators with 6-10 years of experience. This means that a significant number of teachers have already spent several years in the profession, gaining valuable classroom experience, and refining their teaching strategies. However, it is also important to note that some of these teachers may still hold the Teacher I position despite their years of service. This could be due to various factors, such as limited promotion opportunities, the need for additional qualifications like a master's degree, or the absence of available Teacher II or III positions in their schools.

Conversely, the **lowest** frequency in the table is attributed to educators with 21 years and above of teaching experience, representing only 29 (9.51%) respondents. This suggests that fewer senior teachers are part of the study, possibly due to retirements or a smaller number of teachers staying in the profession for over two decades. Experienced teachers bring valuable wisdom, expertise, and mentorship to younger educators. However, they may also face challenges in adapting to ICT-driven instruction. Many of them started teaching when traditional methods were the norm, so transitioning to technology-based teaching can be difficult. They may struggle with learning new digital tools, keeping up with rapidly changing technology, or feeling confident in using ICT effectively in the classroom. This highlights the importance of providing ongoing ICT training and support, ensuring that senior teachers are not left behind.

Table 5
Distribution of Respondents' Perception Towards ICT- Driven Instruction

Indicator	Mean	SD	Description
The use of ICT in classroom makes teaching effective.	2.89	0.67	Agree
The use of ICT in classroom motivates the students to learn.	3.17	0.84	Agree

The use of ICT in classroom promotes students' learning.	2.34	0.59	Agree
The use of ICT reduces teachers' workload to prepare material for his/her class.	3.17	0.84	Agree
The use of ICT in classroom helps teachers to control students' behavioral problems.	2.79	0.63	Agree
The ICT can be used to trace the record of students' performance.	2.80	0.64	Agree
The use of ICT in classroom makes learning more fun and engaging.	3.56	0.89	Strongly Agree
The use of ICT facilitates personalized learning experiences tailored to individual student needs.	3.00	0.77	Agree
The use of ICT enhances collaboration among students, fostering teamwork and peer learning.	3.57	0.90	Strongly Agree
The use of ICT provides real-time feedback to students that aids in their continuous improvement.	2.98	0.71	Agree
Overall	**3.03**	**0.75**	**Agree**

Legend: 3.26-4.00 Strongly Agree / Very Positive 1.76-2.50 Disagree / Negative
2.51-3.25 Agree / Positive 1.00-1.75 Never / Very Negative

Table 5 highlights teachers' perceptions of ICT use in the classroom, with an **overall** mean of 3.03 (SD=0.75), described as Agree and interpreted as Positive. This means that most teachers recognize the benefits of integrating technology into their teaching positively, seeing it as a valuable tool to enhance student engagement and learning. This positive outlook indicates that teachers are open to using digital tools to make lessons more interactive and effective. It also shows their willingness to adapt to modern teaching methods, making learning more accessible and enjoyable for students. Their favorable perception suggests that ICT training and resources provided to schools are helping teachers feel more confident in using technology.

The indicator, **the use of ICT enhances collaboration among students, fostering teamwork and peer learning,** obtained the **highest** mean of 3.57 (SD=0.90) described as Strongly Agree. This means that the teachers are Very Positive that ICT integration encourages student collaboration, making learning more interactive and engaging. This highlights that a teacher strongly believes on technology as it helps students work together, share ideas, and learn from each other. ICT tools make lessons more interactive, allowing students to collaborate easily through group projects, discussions, and digital activities. This positive view suggests that teachers see technology to build teamwork and improve student engagement in the classroom.

On the other hand, the indicator **the use of ICT in the classroom promotes students' learning** got the **lowest** mean value of 2.34 (SD = 0.59) described as Agree. This suggests that while teachers are Positive in the benefits of ICT in improving student learning, they may not see it as highly effective compared to other aspects like collaboration. While teachers recognize that ICT supports student learning, they may feel it is not as impactful as it is for promoting collaboration. Some may believe that traditional teaching methods are still more effective for certain lessons or that students need guidance in using technology wisely.

Problem 2. What is the level of teachers' ICT competence on technology operations and concept, pedagogy, innovative instructional design, content development, and management skills?

Table 6

Distribution of Respondents' Level of Competence on Technology-Driven Instruction Considering Technology Operations and Concept

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I can effectively use operating systems for various computer asks.	2.01	0.51	Disagree
I can troubleshoot basic technical issues.	1.99	0.48	Disagree
I can create engaging multimedia presentations with presentation software.	2.19	0.56	Disagree
I can create and format instructional materials using word processing applications.	3.56	0.90	Strongly Agree
I can use spreadsheet applications to analyze data and create organized charts.	3.45	0.86	Strongly Agree
I can search the internet for reliable teaching information.	3.58	0.93	Strongly Agree
I can assess the credibility of online resources to help students with their research.	3.38	0.82	Strongly Agree
I can use email and messaging apps to communicate efficiently.	3.54	0.87	Strongly Agree
I can utilize online collaboration tools like shared documents and virtual classrooms.	3.12	0.82	Agree
I understand the ethical use of technology to ensure safety and privacy for students and myself.	2.01	0.49	Disagree
Overall	**2.88**	**0.72**	**Agree**

Legend:

3.26-4.00 Strongly Agree / Highly Competent 1.76-2.50 Disagree / Slightly Competent

2.51-3.25 Agree / Competent 1.00-1.75 Strongly Disagree/ Not Competent

Table 6 outlines the respondents' self-assessed pedagogical competence in **technology-driven instruction**, considering technology operations and concepts. The **overall** mean score of 2.88 (SD=0.72) with a description of Agree. The findings implies that teachers see themselves as Competent in using technology for instruction, meaning they have a good grasp of basic operations and concepts. However, there may still be areas where they can improve to fully maximize technology in teaching. Their confidence in their skills is a positive sign that they are open to using digital tools to enhance learning and engage students effectively. It has been observed that technology integration in teaching is not just about knowing how to operate digital tools but also about effectively using them to improve student engagement and learning. Some teachers may still rely on traditional methods due to a lack of confidence in their ability to explore and maximize digital tools. Providing ongoing training and peer mentoring programs can help bridge these gaps, ensuring that all educators feel equipped to integrate technology into their instruction. The indicator, **I can search the internet for reliable teaching information,** obtained the **highest** mean of 3.58 (SD=0.93) described as Strongly Agree. This means that those teachers are Highly Competent in

using the internet to find reliable teaching materials, which helps them stay updated and improve lesson quality. Their ability to search for accurate information allows them to create more engaging and well-informed lessons. This also reflects their adaptability in using online resources to enhance their teaching strategies and support student learning. It has been observed that while many teachers can effectively search for educational resources, some still struggle with identifying credible sources. Without proper digital literacy training, there is a risk of relying on inaccurate or low-quality materials, which can affect lesson quality. Providing targeted training on evaluating online sources, understanding research credibility, and using academic databases could help teachers enhance their ability to find and use reliable information.

Conversely, the indicator **I can troubleshoot basic technical issues**, got the **lowest** mean of 1.99 (SD=0.48) described as Disagree. This means that teachers are Slightly Competent in their ability to resolve basic technical which may affect their ability to use technology smoothly in the classroom. This could lead to delays in lessons when technical problems arise. Despite their competence in finding online resources, they may still rely on others for technical support, which can impact the seamless integration of technology in teaching. It has been observed that teachers often rely on colleagues or technical support rather than solving technical problems independently. This reliance may stem from a lack of formal training in troubleshooting, leading to frustration when technology-related issues arise during lessons. Providing structured training on basic troubleshooting skills could help teachers feel more capable and reduce disruptions in their teaching. Access to simple troubleshooting guides or quick reference materials could also be beneficial in boosting their confidence in handling minor technical difficulties.

Table 7
Distribution of Respondents' Level of Competence on Technology-Driven Instruction Considering Pedagogy

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I can seamlessly integrate technology into my lesson plans, making learning more engaging and effective.	3.18	0.79	Agree
I can use multimedia resources like videos and interactive presentations to adapt teaching for different learning styles.	3.12	0.77	Agree
I can find suitable educational software and apps and adjust my teaching to meet diverse student needs.	3.26	0.84	Strongly Agree
I can use digital assessment tools to create and manage quizzes, tests, and assignments efficiently.	2.01	0.56	Disagree
I can use online platforms for group work and discussions among students.	3.01	0.72	Agree
I can use technology for innovative teaching methods like flipped and blended learning.	3.13	0.77	Agree
I can promote responsible technology use and digital citizenship principles among my students.	1.99	0.54	Disagree
I can use technology to give students instant feedback and support when they need it.	2.14	0.63	Disagree

I can design online learning experiences that encourage active learning and independence among students.	3.25	0.71	Agree
I can use data and analytics from educational technology tools to continuously improve my teaching method.	3.14	0.69	Agree
Overall	**2.82**	**0.70**	**Agree**

Legend: 3.26-4.00 Strongly Agree / Highly Competent 1.76-2.50 Disagree / Slightly Competent
2.51-3.25 Agree / Competent 1.00-1.75 Strongly Disagree/ Not Competent

Table 7 presents the distribution of respondents' level of competence on technology-driven instruction considering **pedagogy**. The **overall** mean score is 2.82 (SD=0.70) described as Agree. This means that most respondents are competent in using technology for instructional purposes meaning they can effectively integrate digital tools into their teaching. Their competence allows them to create engaging lessons that enhance student learning. However, their skill level may still vary, and some may feel more comfortable with certain aspects of technology than others. It has been observed that while many teachers are open to using technology in their classrooms, some struggle with certain tools or platforms, which affects their confidence. For instance, educators who frequently use technology tend to feel more comfortable, while those with limited exposure often hesitate due to unfamiliarity with advanced features. Providing structured training and hands-on practice could help bridge this confidence gap, allowing teachers to maximize the potential of technology in instruction.

Among the pedagogical indicators, the indicator **I can find suitable educational software and apps and adjust my teaching to meet diverse student needs** got the **highest** mean of 3.26 (SD=0.84) described as Strongly Agree. This means that most of the respondents are Highly Competent in their ability to select and utilize digital resources that cater to diverse learning requirements. This indicates that they can adapt their teaching methods to support different learning styles, ensuring that all students have access to appropriate resources. Their ability to effectively use educational software and apps enhances student engagement and helps create a more inclusive learning environment. As observed, many teachers understand the importance of differentiated instruction but there are challenges in selecting and adjusting digital tools to accommodate diverse learning needs.

On the other hand, the indicator **I can promote responsible technology use and digital citizenship principles among my students** got the **lowest** mean of 1.99 (SD=0.54) described as Disagree. This indicates that most of the teachers are Slightly Competent in promoting responsible technology use and teaching students about digital citizenship. This may mean they face challenges in guiding students on how to use technology safely and responsibly. As digital tools become more integrated into classrooms, teachers may need more support and resources to teach students about online safety, ethics, and responsible behavior. As observed, teachers recognize the importance of promoting responsible technology use but they often feel unsure about how to effectively teach these concepts in a way that resonates with students. Without access to well-developed materials and concrete strategies, educators may struggle to integrate digital citizenship naturally into their curriculum. Offering targeted professional development, including practical lesson plans and real-life case studies, could help teachers gain confidence in guiding students toward responsible digital behavior.

Table 8
Distribution of Respondents' Level of Competence on Technology-Driven Instruction Considering Innovative Instructional Design

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I can use technology tools to create interactive and fun learning activities.	3.59	0.88	Strongly Agree
I can make presentations or lessons with videos, pictures, and sounds to keep students engaged.	3.58	0.87	Strongly Agree
I can use educational apps and software to make learning feel like a game.	2.09	0.52	Disagree
I can improve my stories using technology to make learning more interesting.	3.53	0.82	Strongly Agree
I can use virtual reality (VR) and augmented reality (AR) to create exciting learning experiences.	3.50	0.79	Strongly Agree
I can use online quizzes, games, or simulations to help students understand better.	3.34	0.73	Strongly Agree
I can navigate different educational tools that adjust learning to fit each student's needs.	3.52	0.81	Strongly Agree
I can use technology to do projects or inquiries with my students.	3.45	0.69	Strongly Agree
I can handle and lead online discussions or activities that make students think, talk and share ideas to each other.	2.67	0.62	Agree
I can use social media or blogs to get students talking and thinking together.	1.98	0.49	Disagree
Overall	**3.13**	**0.72**	**Agree**

Legend: 3.26-4.00 Strongly Agree / Highly Competent 1.76-2.50 Disagree / Slightly Competent
2.51-3.25 Agree / Competent 1.00-1.75 Strongly Disagree/ Not Competent

Table 8 illustrates the distribution of respondents' competence in technology-driven instruction, considering **innovative instructional design**. The **overall** mean score is 3.13 (SD=0.72) with the description of Agree, suggesting that the teachers are Competent in using technology to design innovative instructional methods. Their competence in instructional design allows them to make learning more interactive and effective for students. This also reflects their willingness to adapt and explore new teaching methods that enhance classroom instruction. The researcher has observed that many teachers are enthusiastic about experimenting with technology in their instruction. However, some struggle with determining the most effective ways to integrate digital tools to enhance student learning.

The indicator, **I can use technology tools to create interactive and fun learning activities,** obtained the **highest** mean of 3.59 (SD=0.88) described as Strongly Agree. The findings indicate that teachers are Highly Competent in utilizing technology to make learning enjoyable and interactive. This means that they can make lessons more enjoyable, helping students stay motivated and actively participate in class. Their ability to integrate digital tools effectively also supports different learning styles, making education more dynamic and learner centered. The researcher has observed that teachers are generally eager to use

technology to make lessons more interactive and enjoyable. However, some struggle with selecting the most appropriate tools or designing activities that align with their learning objectives.

Meanwhile, the indicator, **I can use social media or blogs to get students talking and thinking together,** obtained the **lowest** mean of 1.98 (SD=0.49) described as Disagree. The result means that teachers are Slightly Competent in using social media or blogs as tools to encourage student discussion and collaboration. This may be due to limited experience, concerns about online safety, or uncertainty about how to integrate these platforms effectively in learning. While they are skilled in other digital tools, they may not fully explore social media or blogs as interactive learning spaces. It has been observed that while teachers recognize the value of social media and blogs in fostering student interaction, they often hesitate to incorporate them due to concerns about privacy, distractions, or the lack of clear guidelines. Many educators feel unprepared to manage these platforms in a way that ensures productive learning while maintaining appropriate boundaries between students and online content. Providing structured training programs on how to integrate these tools safely and effectively into instruction could help boost teachers' confidence and willingness to use them.

Table 9
Distribution of the Respondents' Level of Competence on Technology-Driven Instruction Considering Content Development and Management Skills

Indicator	Mean	SD	Description
As a teacher,			
I can create digital content that works well with technology-based teaching.	1.95	0.49	Disagree
I can match digital content with what students need to learn.	2.00	0.50	Disagree
I can put pictures and videos into my teaching materials.	3.53	0.87	Strongly Agree
I can make good content that gets students involved in learning with technology.	2.99	0.57	Agree
I can assure that everyone can use my digital content, no matter how they learn.	2.17	0.52	Disagree
I can keep my digital content up to date and correct.	1.96	0.49	Disagree
I can utilize the Learning Management Systems and can use them well.	2.10	0.51	Disagree
I can learn new digital tools fast and use them to make and manage content.	2.36	0.61	Disagree
I can gather feedback on my digital content to make it better.	2.18	0.53	Disagree
I can follow the rules about using other people's work in my digital content.	1.94	0.48	Disagree
Overall	**2.32**	**0.56**	**Disagree**

Legend: 3.26-4.00 Strongly Agree / Highly Competent 1.76-2.50 Disagree / Slightly Competent 2.51-3.25 Agree / Competent 1.00-1.75 Strongly Disagree/ Not Competent

Table 9 presents the distribution of respondents' competence on technology-driven instruction, with a focus on **content development and management skills.** The **overall** mean score is 2.32 (SD=0.56) with a description of Disagree which means that teachers generally are Slightly Competent in developing and managing digital content for instructional purposes. This may mean they rely more on pre-made materials rather than developing their own. While they are open to using technology, they may find it challenging to design digital resources that fit their teaching needs. This could affect how well they customize lessons to better engage students. As observed, teachers understand the importance of developing their own digital content, but they often feel overwhelmed by the technical demands involved.

The indicator, **I can put pictures and videos into my teaching materials,** obtained the **highest** mean of 3.53 (SD = 0.87) described as Strongly Agree. This means that teachers are Highly Competent in incorporating visual and multimedia elements into their teaching materials to enhance instruction. Using multimedia helps capture students' interest, improve understanding, and make learning more interactive. This also shows that teachers recognize the importance of visual aids in enhancing their instruction. The result discloses that teachers are more likely to embrace technology when it is easy to use and does not require extensive training. Since inserting images and videos is a relatively simple digital skill, it makes sense that most educators feel confident in doing so. However, effectively using multimedia goes beyond just adding visuals—it involves selecting high-quality, relevant content and ensuring that it aligns with learning objectives.

On the other hand, the indicator **I can follow the rules about using other people's work in my digital content** obtained the **lowest** mean of 1.94 (SD = 0.48) described as Disagree. This means that teachers are Slightly Competent in understanding and applying copyright rules, fair use policies, and proper attribution when using digital content in their teaching materials. This may mean they are unsure about fair use policies or how to credit sources correctly. Without a clear understanding of these guidelines, they might unintentionally use materials without proper permission, which could lead to ethical and legal concerns in educational settings. From personal experience, the researcher has observed that teachers tend to prioritize the quality and relevance of their materials rather than the legal aspects of content use.

Table 10
Summary Distribution of Respondents' Level of Competence on Technology-Driven Instruction

Variables	Mean	SD	Interpretation
Technology Operations and Concept	2.88	0.72	Competent
Pedagogy	2.82	0.70	Competent
Innovative Instructional Design	3.13	0.72	Competent
Content Development and Management Skills	2.32	0.56	Slightly Competent
Overall	**2.79**	**0.68**	**Competent**

Legend: 3.26-4.00 Strongly Agree / Highly Competent 1.76-2.50 Disagree / Slightly Competent
2.51-3.25 Agree / Competent 1.00-1.75 Strongly Disagree/ Not Competent

Table 10 summarizes the distribution of the respondents' level of **competence** on technology-driven instruction. The **overall** mean score is 2.79 (SD=0.68) which is interpreted as Competent. This means that, in general, teachers are competent in integrating technology into their teaching practices, though their confidence and skill levels may vary. Their competence reflects their willingness to adapt to modern

teaching methods and enhance student learning. However, the variation in skill levels means some teachers may find certain aspects of technology use easier than others. Despite their overall competence, challenges like troubleshooting technical issues, managing digital content, and following copyright rules remain. These gaps may affect how smoothly they incorporate technology into lessons. Still, their ability to use digital tools for interactive and engaging instruction shows their commitment to improving classroom learning experiences.

The variable, **Innovative Instructional Design,** has the **highest** mean of 3.13 (SD=0.72) which suggests that teachers are Competent in creating innovative instructional designs with the help of ICT. This means they can develop instructional strategies that make learning more interactive and effective for students. Their ability to integrate technology into lesson planning allows them to cater to different learning styles, making education more dynamic and inclusive. Since innovative instructional design focuses on keeping students engaged, this also reflects teachers' adaptability and openness to new teaching methods.

On the other hand, the variable, **Content Development and Management Skills** obtained the **lowest** mean of 2.32 (SD=0.56) which indicates that they are Slightly Competent in this area. This could mean that while they are comfortable using technology for teaching, they may struggle to create or organize digital resources that are tailored to their specific needs. This gap in content development skills could impact how effectively they use technology to enhance learning, as creating personalized and interactive content is crucial for engaging students. The lower competence in this area may also reflect the challenges teachers face in balancing content creation with other responsibilities, such as lesson planning and classroom management. Despite being skilled in other areas of technology integration, teachers might benefit from more support and training in content development to fully maximize their use of digital tools.

Problem 3. What is the level of the teacher's challenges on Technology-Driven Instruction with regards to school ICT facilities, technology adaptability, student's adaptability, and sustainability?

Table 11
Distribution of Respondents' Level of Challenges on Technology-Driven Instruction with regards to School ICT Facilities

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I have limited access to technology due to not having enough computers or devices.	3.57	0.69	Strongly Agree
I have outdated software and hardware that make teaching and learning harder.	3.43	0.61	Strongly Agree
I have inadequate internet connectivity, leading to slow or unreliable access.	3.52	0.63	Strongly Agree
I have insufficient charging stations or power outlets for devices.	3.16	0.69	Agree
I have inadequate storage space for computers and devices, leading to cluttered classrooms.	3.15	0.68	Agree
I have a lack of proper equipment for multimedia presentations and interactive activities.	3.33	0.71	Strongly Agree
I have inadequate infrastructure for audio and video recordings, limiting creative teaching methods.	1.98	0.54	Disagree

I have limited availability of specialized technology, such as science or engineering equipment.	1.97	0.53	Disagree
I have insufficient technical support and maintenance for classroom technology.	3.50	0.79	Strongly Agree
I have inadequate funds for purchasing and upgrading technology, hindering technological advancements in the classroom.	3.71	0.86	Strongly Agree
Overall	**3.13**	**0.67**	**Agree**

Legend: 3.26-4.00 Strongly Agree / Highly Challenged 1.76-2.50 Disagree / Slightly Challenged 2.51-3.25 Agree / Challenged 1.00-1.75 Strongly Disagree/ Not Challenged

Table 11 presents the various challenges faced by Technology-Driven Instruction regarding **School ICT Facilities**. The **overall** mean is 3.13 (SD=0.67), described as Agree and interpreted as Challenged, which indicates that they are challenged to the availability and reliability of ICT facilities in their schools. This could mean that while teachers are willing to use technology, they are limited by the quality or accessibility of the resources available to them. Issues like outdated equipment, poor internet connection, or a lack of sufficient devices can make it difficult for teachers to effectively integrate technology into their lessons. This situation may cause frustration for teachers who want to enhance their teaching with digital tools but are hindered by these challenges. It also highlights the importance of schools investing in better and more reliable ICT facilities to support teachers and students.

The indicator, I **have inadequate funds for purchasing and upgrading technology, hindering technological advancements in the classroom,** got the **highest** mean of 3.71 (SD = 0.86), described as Strongly Agree. This means that teachers feel they are Highly Challenged in acquiring the necessary resources to improve their use of technology. This financial limitation can prevent them from fully utilizing modern tools and resources that could enhance their teaching. Despite their willingness to incorporate technology, the lack of adequate funding means they may have to rely on outdated equipment or make do with fewer resources. This issue does not only affects the quality of teaching but also limits students' exposure to the latest technological advancements, potentially putting them at a disadvantage.

On the other hand, the indicator **I have limited availability of specialized technology, such as science or engineering equipment** obtained the **lowest** mean of 1.97 (SD=0.53) described as Disagree. This means that teachers are Slightly Challenged in accessing specialized technology and the overall sentiment indicates a relatively lesser degree of difficulty in this area compared to other technological challenges. This may mean that, while there are some limitations, teachers are still able to manage with the resources available to them. It could also suggest that specialized technology is not as critical in their day-to-day teaching as other types of ICT tools. However, the lower level of challenge in this area still highlights the importance of having access to specialized tools, especially in subjects like science and engineering, where hands-on experiences with advanced equipment can significantly enhance student learning.

Table 12

Distribution of Respondents' Level of Challenges on Technology-Driven Instruction with regards to Technology Adaptability

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I have limited familiarity with technological tools, which	3.56	0.92	Strongly Agree

makes it hard to use them effectively.			
I have resistance to change, which often stops me from adopting new technologies.	2.98	0.66	Agree
I have difficulties navigating complex software platforms, making technology integration tough.	3.54	0.91	Strongly Agree
I have insufficient training and professional development, which hinders my adaptability.	2.16	0.48	Disagree
I have a lack of confidence in using technology, which can be a big challenge for me.	2.14	0.46	Disagree
I have limited access to necessary technology and resources, which hinders integration efforts.	3.10	0.63	Agree
I have inconsistent support from school administration, that affects my ability to adapt to technology.	2.13	0.44	Disagree
I have unclear expectations and standards for technology integration, which pose challenges.	3.50	0.87	Strongly Agree
I have difficulty aligning technology use with curriculum objectives, thereby creating obstacles.	3.17	0.77	Agree
I have insufficient time and heavy workloads, which may hinder my ability to integrate technology effectively.	3.48	0.91	Strongly Agree
Overall	**2.98**	**0.71**	**Agree**

Legend:

3.26-4.00 Strongly Agree / Highly Challenged 1.76-2.50 Disagree / Slightly Challenged

2.51-3.25 Agree / Challenged 1.00-1.75 Strongly Disagree/ Not Challenged

Table 12 illustrates the distribution of respondents' level of challenges on technology-driven instruction as regards to **technology adaptability**, with an **overall** mean of 2.98 (SD=0.71) described as Agree and interpreted as Challenged. This indicates that teachers face challenges in adapting to new technological tools and integrating them effectively into their teaching practices. This could mean that while they recognize the value of new tools, they might struggle with learning how to use them effectively in the classroom. Teachers may need more time and support to become comfortable with new technologies, as adapting to constantly changing tools can be overwhelming, especially if they do not receive enough training or resources. These challenges can also affect the quality of teaching, as teachers may not be able to fully utilize the potential of new technology if they are not confident in using it. Many educators recognize the benefits of technology in instruction but often encounter difficulties in keeping up with constantly evolving tools and platforms. Some teachers express hesitation in exploring advanced features due to a lack of familiarity or fear of making mistakes. This underscores the importance of ongoing training and hands-on support to help teachers build confidence in technology use.

The indicator, **I have limited familiarity with technological tools, which makes it hard to use them effectively,** got the **highest** mean of 3.56 (SD=0.92) described as Strongly Agree. This suggests that many teachers are Highly Challenged with using technological tools due to a lack of familiarity, making it difficult to integrate these tools into their teaching effectively. The findings show that many teachers feel highly challenged by their limited familiarity with technological tools. This lack of familiarity can make it hard for them to integrate technology effectively into their teaching. This challenge can hinder their ability to fully engage students with technology and may lead to frustration or reluctance to use digital

tools in the classroom. To overcome this, teachers would likely benefit from more structured training programs that focus on hands-on learning and provide ongoing support as they familiarize themselves with new technologies.

On the other hand, the indicator **I have inconsistent support from school administration, that affects my ability to adapt to technology** got the **lowest** mean of 2.13 (SD=0.44) described as Disagree suggesting that most teachers are Slightly Challenged on this aspect and do not see inconsistent administrative support as a major barrier to their ability to integrate technology into their teaching. This implies that teachers generally feel that administrative support, while important, is not a major barrier to their ability to use technology in their classrooms. It could be that teachers are finding ways to adapt and integrate technology on their own, or that the support they do receive is sufficient to help them overcome challenges. However, this also indicates that there might still be room for improvement in providing more consistent and structured support from school leadership. While teachers may not see it as a major issue, having consistent administrative backing could help them feel more confident and empowered in fully embracing technology.

Table 13

Distribution of the Respondents' Level of Challenges on Technology-Driven Instruction as regards to Students' Adaptability

Indicator *As a teacher,*	**Mean**	**SD**	**Description**
I have limited exposure to technology outside the classroom, which may hinder pupils' adaptability.	3.63	0.76	Strongly Agree
I have a lack of prior experience or familiarity with digital tools, posing challenges for pupils in integrating technology.	3.78	0.84	Strongly Agree
I have insufficient training or guidance on using technology during teaching and learning, which hampers pupils' adaptability.	3.77	0.82	Strongly Agree
I have resistance to using technology for learning purposes, which may impede pupils' integration efforts.	3.56	0.51	Strongly Agree
I have limited access to technology devices or internet connectivity outside of school, affecting pupils' ability to use technology.	3.15	0.67	Agree
I have inconsistent availability of necessary software or educational apps, which hinders pupils' adaptability.	3.54	0.74	Strongly Agree
I have technical difficulties or unreliable technology infrastructure, creating obstacles for pupils in accessing and using technology effectively.	3.80	0.93	Strongly Agree
I have limited support or availability of technical assistance during teaching and learning, affecting pupils' technology adaptability.	3.10	0.73	Agree

I have inadequate digital resources or educational materials, impacting pupils' integration efforts.	3.66	0.79	Strongly Agree
I have poorly designed or confused user interfaces of digital tools, making it challenging for pupils to engage with technology effectively in the teaching and learning process.	3.45	0.73	Strongly Agree
Overall	**3.45**	**0.75**	**Strongly Agree**

Legend:

3.26-4.00 Strongly Agree / Highly Challenged 1.76-2.50 Disagree / Slightly Challenged

2.51-3.25 Agree / Challenged 1.00-1.75 Strongly Disagree/ Not Challenged

Table 13 outlines the distribution of the respondents' level of challenges on technology-driven instruction regarding **students' adaptability.** The **overall** mean score is 3.45 (SD=0.75) described as Strongly Agree. This means that most teachers perceive students' adaptability to technology-driven instruction as Highly Challenged. This suggests that while technology is becoming more common in education, not all students can easily adjust to using digital tools for learning. Some students may struggle due to a lack of experience, limited access to devices at home, or difficulty in understanding how to use technology effectively for schoolwork. These challenges can slow down learning and create gaps between students who are comfortable with technology and those who are not.

The indicator, **I have technical difficulties or unreliable technology infrastructure, creating obstacles for pupils in accessing and using technology effectively,** got the **highest** mean of 3.80 (SD=0.93) described as Strongly Agree. This means that most teachers are Highly Challenged by technological limitations, making it difficult for students to fully engage in technology-driven instruction. When internet connections are slow, devices are outdated, or technical issues frequently disrupt lessons, students may lose focus and have difficulty keeping up with digital learning activities. These challenges can lead to frustration among both teachers and students, making technology-driven instruction less effective. Inconsistent access to functional technology can also widen learning gaps, as students who have better access at home may progress faster than those who rely solely on school resources.

On the other hand, the indicator **I have limited support or availability of technical assistance during teaching and learning, affecting pupils' technology adaptability** got the **lowest** mean of 3.10 (SD=0.73) described as Agree and interpreted as Challenged**.** This means that while teachers acknowledge the challenge, the level of difficulty they experience is slightly lower compared to other indicators. When technical assistance is limited, teachers may struggle to fix technical problems quickly, causing delays in lessons and disrupting students' learning. However, since this challenge has a lower level of difficulty compared to others, it suggests that some teachers may have found ways to manage minor technical issues on their own. Despite this, having reliable technical support can still make a big difference in ensuring smooth technology-driven instruction. When teachers can focus more on teaching rather than troubleshooting, students can have a more seamless learning experience.

Table 14
Distribution of the Respondents' Level of Challenges on Technology-Driven Instruction with regards to Sustainability

Indicator *As a teacher,*	***Mean***	***SD***	***Description***
I have an unavailability of necessary resources to sustain technology-driven instruction.	3.54	0.81	Strongly Agree
I have inadequate stability and reliability of the technological infrastructure, leading to disruptions and inefficiencies.	3.57	0.83	Strongly Agree
I have a lack of financial sustainability, which undermines ongoing technology integration in education and hinders progress.	3.16	0.73	Agree
I have limited continuous training opportunities for educators, resulting in difficulties adapting to evolving technology.	3.28	0.77	Strongly Agree
I have inaccessible and non-user-friendly technology, which hampers participation and engagement in the educational process.	3.26	0.74	Strongly Agree
I have irregular updating and lack of relevance on digital content, diminishing effectiveness and limiting educational outcomes.	2.31	0.71	Disagree
I have minimal community engagement and support, jeopardizing the long-term success of technology-driven instruction.	2.17	0.60	Disagree
I have failure to adopt energy-efficient technologies, contributing to environmental degradation and unsustainable practices in education.	2.26	0.67	Disagree
I have insufficient implementation of data security measures, eroding user trust and compromising sensitive information.	3.78	0.91	Strongly Agree
I have disregarded the environmental impact of technology-driven instruction, exacerbating ecological harm and undermining sustainable practices.	1.98	0.53	Disagree
Overall	**2.93**	**0.73**	**Agree**

Legend:
3.26-4.00 Strongly Agree / Highly Challenged 1.76-2.50 Disagree / Slightly Challenged
2.51-3.25 Agree / Challenged 1.00-1.75 Strongly Disagree/ Not Challenged

Table 14 examines the respondents' level of challenges on technology-driven instruction with regards to **sustainability.** The **overall** mean score is 2.93 (SD=0.73) described as Agree. The finding reveals that most teachers are Challenged in sustaining the effective use of technology in their instruction. This challenge may come from limited resources, lack of regular training, or the need for ongoing technical support. Without proper funding and consistent updates, teachers may find it difficult to keep up with new

technologies, affecting their ability to integrate them effectively into lessons. Additionally, the sustainability of technology use in the classroom depends on school policies and administrative support, which can influence how well teachers adapt to and maintain digital instruction.

The indicator **I have insufficient implementation of data security measures, endangering user trust and compromising sensitive information,** got the **highest** mean of 3.78 (SD=0.91), described as Strongly Agree interpreted as Highly Challenged. This means that most teachers are highly challenged in ensuring data security, which affects user trust and puts sensitive information at risk. This challenge may come from a lack of proper training on data protection, limited security measures in schools, or uncertainty about best practices for handling digital information. When data security is weak, both teachers and students may be vulnerable to privacy issues, cyber threats, or unauthorized access to important files. This can create concerns about using technology in education, as trust in digital tools is essential for effective learning. Teachers may need more support in understanding safe data practices to help protect both their own information and that of their students.

On the other hand, the indicator **I have disregarded the environmental impact of technology-driven instruction, exacerbating ecological harm and undermining sustainable practices,** got the **lowest** mean of 1.98 (SD=0.53), described as Disagree interpreted as Slightly Challenged, which means that most teachers do not perceive environmental concerns as slightly challenged in technology-driven instruction. This may be because their focus is on teaching effectiveness rather than the ecological impact of using digital tools. Many schools also do not emphasize sustainability in technology use, which may contribute to a lack of awareness. However, while this challenge is perceived as less significant, responsible technology use is still important. Proper e-waste management, energy-efficient devices, and mindful printing practices can help minimize the environmental impact of technology in education. Encouraging sustainable habits among teachers and students can support long-term ecological responsibility.

Table 15
Summary Distribution of the Respondents' Level of Challenges on Technology-Driven Instruction

Indicators	Mean	SD	Interpretation
School ICT Facilities	3.13	0.67	Challenged
Technology Adaptability	2.98	0.71	Challenged
Students' Adaptability	3.45	0.75	Highly Challenged
Sustainability	2.93	0.73	Challenged
Overall	**3.12**	**0.72**	**Challenged**

Legend:
3.26-4.00 Strongly Agree / Highly Challenged 1.76-2.50 Disagree / Slightly Challenged
2.51-3.25 Agree / Challenged 1.00-1.75 Strongly Disagree/ Not Challenged

Table 15 presents the summary of the respondents' perceived level of **Challenges** on Technology-Driven Instruction, with four main indicators: School ICT Facilities, Technology Adaptability, Students' Adaptability, and Sustainability. The **overall** mean is 3.12 (SD=0.72), which indicates that the respondents generally feel Challenged in these areas. The findings show that teachers generally feel challenged in several key areas of technology-driven instruction, including school ICT facilities, adaptability to new

technologies, students' ability to adjust to tech-based learning, and the long-term sustainability of using technology effectively. This suggests that while teachers recognize the importance of integrating technology, they face hurdles in ensuring that both the infrastructure and the support systems are in place to make this integration smooth and lasting. Improving school facilities, providing consistent technical support, and addressing sustainability concerns could help ease these challenges. Teachers also need continuous professional development to enhance their ability to adapt to new tools and to help students adapt as well. These efforts will not only improve the current use of technology but also ensure its effective use in the future.

The variable, **Students' Adaptability**, got the **highest** mean of 3.45 (SD=0.75), interpreted as Highly Challenged. This means that most teachers perceive student adaptability to technology-driven instruction as highly challenged. The high challenge score for students' adaptability to technology-driven instruction reflects that many teachers feel students struggle with adjusting to tech-based learning. This could be due to various factors such as a lack of digital literacy, limited access to devices, or inadequate training on how to effectively use technology in learning. It highlights the need for additional support, both for teachers and students, to bridge the gap in adapting to digital tools. Schools may need to provide more training for students to build their digital skills and confidence, ensuring they can make the most of technology in their education.

On the other hand, the variable, **Sustainability,** obtained the **lowest** mean of 2.93 (SD=0.73), interpreted as Challenged. This means that while teachers recognize the importance of sustaining technology-driven instruction, they are challenged in ensuring its long-term viability. The lower challenge score for sustainability suggests that while teachers understand the need for long-term planning and resources to keep technology in the classroom, they face difficulties in maintaining it over time. This could be due to factors like insufficient funding, lack of ongoing training, or the rapid pace of technological change, which requires constant updates to both equipment and teaching strategies. To ensure the continued success of technology in education, schools may need to prioritize long-term investments in infrastructure, regular professional development, and strategies for managing the evolving tech landscape. This will help teachers maintain the effectiveness of technology in their teaching practices.

Problem 4. Is there a significant relationship between the teachers' ICT competence and their challenges on technology-driven instruction?

Table 16
Result of the Test on Significant Relationship Between the Teachers' Competence and their Challenges on Technology-Driven Instruction

Teachers' Competence on Technology	**Teacher's Challenges on Technology - Driven Instruction**				
	School ICT Facilities	**Adaptability**	**Student's Adaptability**	**Sustainability**	**Overall**
	r-value p-value	**r-value p-value**	**r-value p-value**	**r-value p-value**	**r-value p-value**
Operations and Concept	0.183 0.0015 S	0.148 0.0024 S	0.639 0.1340 NS	0.362 0.0163 S	**0.334** **0.0386** **S**

Pedagogical	0.875	0.340	0.701	0.360	**0.561**
	0.0015	0.0289	0.160	0.0480	**0.0596**
	S	S	NS	S	**NS**
Innovative	0.362	0.366	0.361	0.450	**0.386**
Instructional	0.0136	0.0189	0.0236	0.0179	**0.0185**
Design	S	S	S	S	**S**
Content	0.430	0.976	0.977	0.167	**0.639**
Development	0.0126	0.142	0.0139	0.0034	**0.043**
And	S	NS	S	S	**S**
Management					
Skills					

Note: *Significant if p-value < 0.05**

Table 16 shows the correlation coefficients (r-values) and p-values of the **relationship** between Teacher's Competence and their Challenges on Technology-Driven Instruction. The table categorized Teachers' Competence on Technology into four areas: Technology Operations and Concept, Pedagogical, Innovative Instructional Design and Content Development and Management Skills. The challenges on Technology-Driven Instruction analyzed include School ICT Facilities, Adaptability, Students' Adaptability and Sustainability. This suggests the need to study how leadership affects the connection between teachers' competence and the challenges they face in using technology for teaching. Strong leadership can provide guidance, training, and support, helping teachers develop their skills and overcome difficulties in technology-driven instruction.

These findings highlight the importance of continuous teacher training and access to proper technological resources. If teachers are well-equipped with the right skills, they can adapt to new teaching methods, make the most of available ICT facilities, and support students in using technology effectively. Schools and policymakers should focus on providing ongoing professional development, improving ICT infrastructure, and ensuring long-term support for technology integration. By doing so, they can enhance the overall quality of education and create a more sustainable and effective technology-driven learning environment.

In contrast, the findings reveal that there is no significant relationship between teachers' competence in technology-driven instruction in terms of pedagogy and the challenges they encountered, as indicated by the p-values. Since the null hypothesis, which stated that no significant relationship exists between teachers' competence in technology-driven instruction in terms of pedagogy and the challenges they encountered, was accepted, this suggests that a teacher's ability to design and deliver lessons using technology does not necessarily determine the difficulties faced in its implementation. While pedagogical knowledge remains crucial for effective instruction, external elements may play a more dominant role in shaping these challenges.

A key takeaway from this result is that strengthening teachers' pedagogical competence alone may not be sufficient to overcome obstacles in technology-driven instruction. Schools must also focus on improving access to digital tools, ensuring reliable technical support, and fostering a supportive learning environment where both teachers and students feel confident using technology. Even educators with advanced teaching skills may struggle if these fundamental needs are not met.

DepEd's efforts to integrate technology into the classroom align with these findings. For example, the DepEd ICT Literacy Plan (2019) emphasizes the importance of equipping teachers with the necessary

training and resources. They argue that when teachers are provided with the right support and ICT facilities, they are more capable of overcoming challenges, such as adapting new technologies and ensuring these technologies are effectively and sustainably integrated into their teaching practices. The significance found in the relationship between teacher competence and school ICT facilities aligns with these initiatives, illustrating that investing in teacher development and infrastructure is essential for the success of technology-driven instruction.

Problem 5. Is there a significant difference in the teachers' challenges on technology-driven instruction when grouped according to their profile?

Table 17
Result of the Difference in the Teachers' Challenges on Technology-Driven Instruction when Grouped According to their Profile

Respondents' Characteristics				
School ICT Facilities	Technology Adaptability	Student's Adaptability	Sustainability	
t-value p-value	t-value p-value	t-value p-value	t-value p-value	
Grade Level	0.4320	0.3209	0.6450	0.3298
Taught	0.0101	0.3200	0.2093	0.0001
	S	NS	NS	S
Position	0.1654	0.3690	0.4749	0.4890
	0.0001	0.0001	0.1609	0.0001
	S	S	NS	S
Highest	0.3765	0.6523	0.1980	0.7450
Educational	0.0001	0.0001	0.0208	0.0001
Attainment	S	S	S	S
Teaching	0.1654	0.4806	0.2764	0.3286
Experience	0.0001	0.0001	0.0109	0.0002
	S	S	S	S
Perception	0.5632	0.1549	0.2760	0.4705
Towards ICT	0.1760	0.0109	0.0001	0.0001
Driven	NS	S	S	S
Instruction				
Overall	**0.3405**	**0.3956**	**0.3741**	**0.4726**
	0.0373	**0.0662**	**0.0804**	**0.0001**
	S	**NS**	**NS**	**S**

Note: *Significant if p-value < 0.05**

Table 17 explores the results of a statistical test analyzing the **significant difference** in the teachers' challenges on technology-driven instruction when grouped according to their profile. It provides insights into the factors influencing these challenges, covering four dimensions: school ICT facilities, technology adaptability, students' adaptability, and sustainability. Each profile characteristic such as grade level

taught, position, highest educational attainment, teaching experience, and perception toward ICT-driven instruction was evaluated for its significance in relation to these challenges.

The results show that there is a significant difference in how teachers experience the challenges of technology-driven instruction based on their position, highest educational attainment, teaching experience, and perception of ICT-driven instruction. Hence, the null hypothesis is rejected. This means that these factors influence how teachers face and respond to technology-related challenges in their classrooms.

One important implication of this finding is that teachers with different backgrounds and levels of experience may have unique needs when it comes to technology integration. For example, more experienced teachers may struggle with adapting to new digital tools, while younger or less experienced teachers might find it easier to use technology but lack confidence in applying it effectively in teaching. Similarly, those with higher educational attainment may have received more formal training in technology use, making them more prepared to handle ICT-related challenges.

This highlights the need for targeted support and training programs that address the specific needs of different groups of teachers. Instead of using a one-size-fits-all approach, schools should provide customized professional development opportunities based on teachers' positions and levels of experience. Administrators should also foster a collaborative learning environment where teachers can share best practices and mentor each other in using technology effectively.

Furthermore, teachers' perceptions of ICT-driven instruction play a critical role in their ability to overcome challenges. Those who see technology as beneficial are more likely to find ways to integrate it successfully, while those who are hesitant may struggle more.

The results indicate that there is no significant difference in the challenges teachers face in technology-driven instruction based on the grade level they teach. Since the null hypothesis, which stated that no significant difference exists, was accepted, this means that teachers across different grade levels experience similar difficulties when integrating technology into their teaching. Whether they teach lower or higher grades, they likely encounter common challenges such as limited ICT resources, difficulty adapting to new digital tools, and students' varying levels of technological readiness.

One important implication of this finding is that technology-related difficulties are not specific to a particular grade level but are instead shared across all levels of education. This suggests that the barriers to effective technology integration are more likely influenced by broader factors such as school infrastructure, access to digital tools, and institutional support rather than differences in curriculum or student age.

Since these challenges affect all teachers equally, schools should focus on providing universal solutions that address these issues at a system-wide level. This could include improving ICT facilities, offering school-wide training programs, and ensuring that teachers receive continuous support regardless of the grade level they handle. Additionally, fostering a collaborative environment where teachers share strategies and best practices can help create a more unified approach to overcoming these challenges.

Discussion

This study analyzed the profile of 305 teacher-respondents from public elementary schools in the Schools Division of Camiguin. The majority were Grade 6 teachers, making up 38% (175 respondents). Regarding educational attainment, 44.92% (137 respondents) had taken units toward a Master's Degree. In terms of teaching experience, the largest group had 6 to 10 years of experience, representing 27.21% (83 respondents). Additionally, most teachers had a "Very Positive" perception of ICT use in the classroom.

The study found that teachers are generally "competent" in technology-driven instruction, indicating their ability to integrate technology into their teaching practices. However, among the different aspects of technology-driven instruction, they are only "slightly competent" in Content Development and Management Skills. This suggests that while teachers can use technology in the classroom, they may struggle with creating and organizing digital content effectively, as well as managing technological tools for instruction. This highlights the need for additional training and support in these areas to enhance their overall competence.

Teachers also face challenges in technology-driven instruction, encountering difficulties in effectively implementing and sustaining its use. Among these challenges, they are "highly challenged" in terms of Student Adaptability. This means that students may struggle to adjust to technology-based learning, which can affect engagement, comprehension, and overall classroom effectiveness. Addressing this challenge requires strategies to enhance students' digital literacy, provide proper guidance, and ensure that technology is used in a way that supports diverse learning needs.

Meanwhile, a significant relationship was found between teachers' competence and the challenges they encounter in technology-driven instruction, particularly in technology operations and concepts, innovative instructional design, content development, and management skills. This suggests that as teachers develop their technical and instructional skills, the challenges they face in these areas may also change. However, pedagogical competence alone does not show a significant relationship, indicating that effective technology integration relies more on technical proficiency and instructional strategies rather than traditional teaching methods alone.

Additionally, the challenges teachers face in technology-driven instruction vary significantly based on their position, highest educational attainment, teaching experience, and perception of technology-driven instruction. This indicates that factors such as professional rank, educational background, and experience influence the difficulties teachers encounter in integrating technology. However, the grade level taught does not show a significant difference in these challenges, suggesting that technology-related difficulties are consistent across different elementary grade levels. For instance, both a Grade 2 and a Grade 6 teacher may experience the same issues, such as unreliable internet access or difficulty in keeping students engaged in technology-driven learning, regardless of the specific content they teach.

Problem 6. What improved school ICT Development Plan can be formulated based on the findings of the study?

Table 18
Matrix of School Development Plan

Year 1: Foundational Framework							
Areas of Concern	**Specific Objectives**	**Strategies / Activities**	**Time Frame**	**Person/s Involved**	**Source of Fund**	**Estimated Budget**	**Expected Outcome**
Content Development and Management Skills	1. To help teachers learn how to create digital content.	Conduct basic training on digital content	Q1	Teachers, Trainers	SEF MOOE/ Local Funds	Php 20,000	Teachers can create simple digital content.

		creation. Hands-on practice in making digital presentations and learning materials. Peer sharing session where teachers showcase and give feedback on their digital content..					
	2. To improve the use of images and videos in teaching materials.	Practice session on editing and enhancing images and videos. Demonstration of best practices in using multimedia for lessons..	Q2	Teachers, IT Experts	SEF MOOE/ Local Funds	Php 10,000	Teachers can effectively add multimedia to lessons.
	3. To teach proper use of digital content in lessons.	Demonstration of digital content application.	Q3	Teachers, Trainers	SEF MOOE/ Local Funds	Php 20,000	Teachers apply digital content effectively
Sustainability	1. Establish a long-term plan for maintaining and upgrading ICT facilities.	Conduct an ICT sustainability assessment and develop	Q1	School ICT Coordinator, Administrators, IT Support Staff	School MOOE, External Grants	Php 50,000	A clear sustainability plan for ICT resources

		a maintenance plan.					is in place.
	2. Strengthen teachers' capacity to integrate technology efficiently over time.	Provide training on maximizing available technology and low-cost digital teaching strategies.	Q3	Teachers, ICT Trainers, School Heads	School Funds, Partnerships	Php 10,000	Teachers gain skills in using technology effectively with minimal resource dependency.
	3. Develop partnerships for continuous support and resource-sharing.	Collaborate with LGUs, NGOs, and private sectors for ICT donations and support programs.	Q3-Q4	School Heads, ICT Coordinator, Local Government, Private Partners	LGU, Private Sponsors	Php 50,000	Sustainable access to ICT tools and support through partnerships.

Year 2: Strengthening Initiatives							
Areas of Concern	**Specific Objectives**	**Strategies/ Activities**	**Time Frame**	**Person/s Involved**	**Source of Fund**	**Estimated Budget**	**Expected Outcome**
Content Development and Management Skills	1. To improve teachers' ability to create engaging digital content	Conduct hands-on workshops on content creation (e.g., using Canva, PowerPoint, and video tools)	Q1-Q2	Teachers, IT Experts, School Admin	SEF MOOE/ Local Funds	Php 10,000	Teachers can create interactive and engaging digital content
	2. To improve teachers' ability to create engaging	Conduct hands-on workshops on content creation (e.g., using	Q1-Q2	Teachers, IT Experts, School Admin	SEF MOOE/ Local Funds	Php 15,000	Teachers can create interactive and engaging digital content

	digital content	Canva, PowerPoint, and video tools)					
	3. To Improve teachers' ability to create engaging digital content	Conduct hands-on workshops on content creation (e.g., using Canva, PowerPoint, and video tools)	Q1-Q2	Teachers, IT Experts, School Admin	SEF MOOE/ Local Funds	Php 5,000	Teachers can create interactive and engaging digital content
Sustainability	1. To ensure continuous access to functional ICT equipment and resources.	Implement regular maintenance and upgrade schedules for ICT facilities.	Year-round	ICT Coordinator, School Administrator, IT Support Team	School MOOE, LGU Support, Private Donors	Php 10,000	Well-maintained and upgraded ICT resources for uninterrupted technology-driven instruction.
	2. To provide ongoing professional development to sustain teachers' technology skills.	Conduct advanced training and refresher courses on technology integration.	Quarterly	School Head, ICT Trainers, Teachers	DepEd Programs, External Grants, PTA Contributions	Php 20,000	Teachers remain confident and updated in using technology for instruction.
	3. To establish a technology sustainability plan for long-term use.	Develop a policy on ICT resource management, including funding, repairs, and replacements.	Mid-Year	School Governing Council, ICT Team, LGU Representatives	LGU, School Funds, Stakeholder Partnerships	Php 15,000	A structured and well-funded plan ensures the sustainability of technology-driven instruction.

Year 3: Integration and Tailoring							
Areas of Concern	**Specific Objectives**	**Strategies/ Activities**	**Time Frame**	**Person/s Involved**	**Source of Fund**	**Estimated Budget**	**Expected Outcome**
Content Development and Management Skills	1. To improve the ability to create and customize digital teaching materials.	Conduct workshops on digital content creation using various tools.	Quarterly	Teachers, IT Experts, School Administrators	SEF MOOE/ Local Funds	Php 20,000	Teachers can develop interactive and engaging digital materials.
	2. To enhance teachers' skills in using Learning Management Systems (LMS).	Hands-on training on LMS features and management.	Monthly	Teachers, LMS Trainers	SEF MOOE/ Local Funds	Php 15,000	Teachers can effectively manage and update digital learning content.
	3. To ensure accessibility and adaptability of digital content for diverse learners.	Develop guidelines and templates for inclusive digital content.	Bi-Annual	Teachers, Special Education Experts	SEF MOOE/ Local Funds	PHP 10,000	Digital content is more accessible and adaptable for different learners.
Sustainability	1. Ensure long-term availability and maintenance of ICT resources for continuous technology-driven instruction.	Establish an ICT maintenance and upgrade plan, including periodic system checks and replacement of outdated equipment.	Year-round	ICT Coordinator, School Heads, LGU, IT Support Staff	School MOOE, LGU Support, Private Sponsors	Php 50,000	Well-maintained and up-to-date ICT facilities for sustainable instruction.

	2. Develop teacher capacity for sustained use of technology in instruction.	Conduct regular hands-on ICT training and peer mentoring sessions to reinforce tech integration skills.	Quarterly	ICT Coordinator, Master Teachers, School Heads	School MOOE, Partnerships with Tech Companies	Php 20,000	Teachers are confident and skilled in integrating technology in lessons.
	3. Strengthen partnerships with stakeholders to secure funding and support for ICT sustainability.	Establish Memorandums of Agreement (MOA) with local government, private companies, and NGOs for ICT donations and training support.	Year-round	School Heads, DepEd Officials, LGU, Private Sector Partners	LGU, CSR Programs, Educational Grants	PHP 30,000	Continuous financial and material support for ICT sustainability in schools.

Conclusion

Based on the findings, the study concluded that public elementary school teachers were generally competent in technology-driven instruction, particularly in the areas of technology operations, pedagogy, and instructional design. However, they showed only slight competence in content development and management skills, indicating a need for targeted training in creating and organizing digital materials. Teachers also faced notable challenges, especially in terms of student adaptability and limited ICT facilities, which affected the effectiveness of classroom integration. Despite these challenges, teachers maintained a strong and positive perception toward ICT-driven instruction, demonstrating their openness to digital innovation in education. These findings come up with the Teacher-Centered Digital Adaptability Theory, which builds on Rogers' Person-Centered Theory and emphasizes that teacher empowerment, continuous support, and a nurturing environment are essential for successful technology integration in basic education.

References

1. Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic review. *Frontiers in psychology*

, *13*. https://doi.org/10.3389/fpsyg.2022.920317
2. Teaching Critical Thinking Skills: Literature Review. (2020). *TOJET: The Turkish Online Journal of Educational Technology – January 2020, Volume 19 Issue 1*, *Volume 19*(1).
3. Amhag, L., Hellström, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education*, *35*(4), 203–220. https://doi.org/10.1080/21532974.2019.1646169
4. Technology Adoption Readiness in Disadvantaged Universities during COVID-19 Pandemic in South Africa. (2022). *International Journal of Higher Education*, *11*(2).
5. Asad, M. M., Hussain, N., Wadho, M., Khand, Z. H., & Churi, P. P. (2020). Integration of e-learning technologies for interactive teaching and learning process: an empirical study on higher educationinstitutes of Pakistan. *Journal of Applied Research in Higher Education*, *13*(3), 649–663. https://doi.org/10.1108/jarhe-04-2020-0103
6. Atabek, O. (2020). Associations between emotional states, Self-Efficacy for and attitude towards using educational technology. *International Journal of Progressive Education*, *16*(2), 175–194. https://doi.org/10.29329/ijpe.2020.241.12
7. Balol, N. (2023). The Use of ICT to Encourage Student's Engagement with Collaborative Learning. *International Journal of Linguistics Literature & Translation*, *6*(2), 42–49. https://doi.org/10.32996/ijllt.2023.6.2.6
8. Baran, E., Bilici, S. C., Sari, A. A., & Tondeur, J. (2017). Investigating the impact of teacher education strategies on preservice teachers' TPACK. *British Journal of Educational Technology*, *50*(1), 357–370. https://doi.org/10.1111/bjet.12565
9. Baruch, A. F., & Ungar, O. A. (2019). ICT Implementation in Colleges of Education: A framework for Teacher Educators. *Journal of Information Technology Education Research*, *18*, 207–229. https://doi.org/10.28945/4312
10. Bariu, T. N. (2020). Status of ICT infrastructure used in teaching and learning in secondary schools in Meru County, Kenya. *European Journal of Interactive Multimedia and Education*, *1*(1), e02002.https://doi.org/10.30935/ejimed/8283
11. Batan, M. B., Treceñe, J. K. D., Santos, J. R. N. D., & Paler, R. R. (2022). Assessment of Competencies in Technology Operation and Concepts among Teachers in a Philippine State University. *EuropeanJournal of Education and Pedagogy*, *3*(3), 306–309. https:/doi.org/10.24018/ejedu.2022.3.3.389
12. Bernadine, G. G. K. (2019). Challenges Faced by Educators in the Implementation of Continuing Professional Teacher Development (CPTD): Gauteng Province. In *IntechOpen eBooks*. https://doi.org/10.5772/intechopen.84836
13. Birisci, S., & Kul, E. (2019). Predictors of Technology Integration Self-Efficacy Beliefs of preservice teachers. *Contemporary Educational Technology*, *10*(1), 75–93. https://doi.org/10.30935/cet.512537
14. Buda, A. (2020). Stumbling blocks and barriers to the use of ICT in schools: a case study of a Hungarian town. *Informatics in Education*, 159–179. https://doi.org/10.15388/infedu.2020.08
15. Budiongan, J., & Corpuz, G. G. (2024). School climate and teachers' work engagement in Misamis Oriental: Basis for development plan. *European Modern Studies Journal*, *8*(2), 129–162. https://doi.org/10.59573/emsj.8(2).2024.13

16. Bui, T. H. (2022). English teachers' integration of digital technologies in the classroom. *International Journal of Educational Research Open*, *3*, 100204. https://doi.org/10.1016/j.ijedro.2022.100204
17. Bygstad, B., Øvrelid, E., Ludvigsen, S., & Dæhlen, M. (2022). From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education*, *182*, 104463. https://doi.org/10.1016/j.compedu.2022.104463
18. Cabero-Almenara, J., Gutiérrez-Castillo, J., Barroso-Osuna, J., & Rodríguez-Palacios, A. (2023). Digital teaching competence according to the DIGCOMPEDU Framework. Comparative study in different Latin American universities. *Journal of New Approaches in Educational Research*, *12*(2), 276–291. https://doi.org/10.7821/naer.2023.7.1452
19. Capuno, R., Suson, R., Suladay, D., Arnaiz, V., Villarin, I., & Jungoy, E. (2022). Digital citizenship in education and its implication. *World Journal on Educational Technology Current Issues*, *14*(2), 426– 437. https://doi.org/10.18844/wjet.v14i2.6952
20. Carrillo, C., & Flores, M. A. (2022). Online teaching and learning practices in teacher education after COVID- 19: lessons learnt from the literature. *Journal of Education for Teaching International Research and Pedagogy*, *49*(5), 869–881. https://doi.org/10.1080/02607476.2022.2153018
21. Cavanaugh, K. C., Bell, T. W., Aerni, K. E., Byrnes, J. E., McCammon, S., & Smith, M. M. (2024). New technologies for monitoring coastal ecosystem dynamics. *Annual Review of Marine Science*. https://doi.org/10.1146/annurev-marine-040523-020221
22. Celeste, R. J., & Osias, N. (2024). Challenges and Implementation of Technology Integration: Basis for enhanced instructional program. *American Journal of Arts and Human Science*, *3*(2), 106–130. https://doi.org/10.54536/ajahs.v3i2.2656
23. Cervera, M. G., & Caena, F. (2022). Teachers' digital competence for global teacher education. *European Journal of Teacher Education*, *45*(4), 451–455. https://doi.org/10.1080/02619768.2022.2135855
24. Clipa, O., Delibas, C., & Mâță, L. (2023). Teachers' Self-Efficacy and Attitudes towards the Use of Information Technology in Classrooms. *Education Sciences*, *13*(10), 1001.https://doi.org/10.3390/educsci13101001
25. Dawson, P. (2020). Defending assessment security in a digital world. In *Routledge eBooks*. https://doi.org/10.4324/9780429324178
26. Dhar, S., Khare, A., & Singh, R. (2022). Advanced security model for multimedia data sharing in Internet of Things. *Transactions on Emerging Telecommunications Technologies*, *34*(11). https://doi.org/10.1002/ett.4621
27. Dlamini, R. (2018). INFORMATION AND COMMUNICATION TECHNOLOGY PEDAGOGICAL AFFORDANCES IN EDUCATION: A CRITICAL REVIEW OF LITERATURE. *INTED Proceedings*, *1*, 2503. https://doi.org/10.21125/inted.2018.0473
28. Esfijani, A., & Zamani, B. E. (2020). Factors influencing teachers' utilisation of ICT: the role of in-service training courses and access. *Research in Learning Technology*, *28*(0). https://doi.org/10.25304/rlt.v28.2313
29. Farjon, D., Smits, A., & Voogt, J. (2018). Technology integration of pre-service teachers explained by attitudes and beliefs, competency, access, and experience. *Computers & Education*, *130*, 81–93. https://doi.org/10.1016/j.compedu.2018.11.010

30. Fernández-Gutiérrez, M., Gimenez, G., & Calero, J. (2020). Is the use of ICT in education leading to higher student outcomes? Analysis from the Spanish Autonomous Communities. *Computers & Education*, *157*, 103969. https://doi.org/10.1016/j.compedu.2020.103969
31. Francom, G. M. (2019). Barriers to technology integration: A time-series survey study. *Journal of Research on Technology in Education*, *52*(1), 1–16. https://doi.org/10.1080/15391523.2019.1679055
32. Francom, G. M., Lee, S. J., & Pinkney, H. (2021). Technologies, Challenges and Needs of K-12 Teachers in the Transition to Distance Learning during the COVID-19 Pandemic. *TechTrends*, *65*(4), 589–601. https://doi.org/10.1007/s11528-021-00625-5
33. Francotte, E., Colognesi, S., & Coertjens, L. (2023). Co-creating tools to monitor first graders' progress in reading: a balancing act between perceived usefulness, flexibility, and workload. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1111420
34. Gess-Newsome, J., Taylor, J. A., Carlson, J., Gardner, A. L., Wilson, C. D., & Stuhlsatz, M. a. M. (2017). Teacher pedagogical content knowledge, practice, and student achievement. *International Journal of Science Education*, *41*(7), 944–963. https://doi.org/10.1080/09500693.2016.1265158
35. Gilbert, M. R., & Masucci, M. (2019). Defining the geographic and policy dynamics of the digital divide. In *Springer eBooks* (pp. 3653–3671). https://doi.org/10.1007/978-3-030-02438-3_39
36. Gómez-Galán, J. (2020). Media Education in the ICT Era: Theoretical structure for innovative teaching styles. *Information*, *11*(5), 276. https://doi.org/10.3390/info11050276
37. Gonzales, I. B., Corpuz, D. A., & Dellosa, R. M. (2020). RESEARCH CAPABILITIES OF PUBLIC ELEMENTARY SCHOOL TEACHERS AND MANAGEMENT SUPPORT OF THE SCHOOLSDIVISION OF NUEVA VIZCAYA, PHILIPPINES. *Humanities & Social Sciences Reviews*, *8*(4), 258–266. https://doi.org/10.18510/hssr.2020.8427
38. Greenhow, C., & Lewin, C. (2015). Social media and education: reconceptualizing the boundaries of formal and informal learning. *Learning Media and Technology*, *41*(1), 6–30. https://doi.org/10.1080/17439884.2015.1064954
39. Hafeez, M. (2021). Impact of teacher's training on interest and academic achievements of students by multiple teaching methods. *Pedagogical Research*, *6*(3), em0102. https://doi.org/10.29333/pr/11088
40. Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004
41. Hébert, C., Jenson, J., & Terzopoulos, T. (2021). "Access to technology is the major challenge": Teacher perspectives on barriers to DGBL in K-12 classrooms. *E-Learning and Digital Media*, *18*(3), 307–324. https://doi.org/10.1177/2042753021995315
42. Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., Brugha, M., & Zubairi, A. (2022). Technology Use for Teacher Professional Development in Low- and Middle-Income Countries: A systematic review. *Computers and Education Open*, *3*, 100080. https://doi.org/10.1016/j.caeo.2022.100080
43. Highland, K. D., & Fedtke, J. (2023). Rethinking the essay: student perceptions of collaborative digitalmultimodal composition in the college classroom. *Higher Education Pedagogies*, *8*(1). https://doi.org/10.1080/23752696.2023.2216194

44. Hodgson, V., & Shah, U. (2016). A phenomenographic study of lecturers' conceptions of using learning technology in a Pakistani context. *Learning Media and Technology*, *42*(2), 198–213. https://doi.org/10.1080/17439884.2016.1154074
45. Holzmann, P., & Gregori, P. (2022). The promise of digital technologies for sustainable entrepreneurship: A systematic literature review and research agenda. *International Journal of Information Management*, *68*, 102593. https://doi.org/10.1016/j.ijinfomgt.2022.102593
46. Hu, J., Peng, Y., Chen, X., & Yu, H. (2021). Differentiating the learning styles of college students in different disciplines in a college English blended learning setting. *PLoS ONE*, *16*(5), e0251545. https://doi.org/10.1371/journal.pone.0251545
47. Hughes, C. (2020). The changing learning technological landscape for trainers in the wake of COVID-19. *Advances in Developing Human Resources*, *23*(1), 66–74. https://doi.org/10.1177/1523422320972108
48. Ibrahimi, E., Miri, F., & Koçiaj, I. (2024). An assessment of the integration of ICTs into teaching processes by science teachers: The case of Albania. *Journal of Technology and Science Education*, *14*(2), 405. https://doi.org/10.3926/jotse.2319
49. Kaminskienė, L., Järvelä, S., & Lehtinen, E. (2022). How does technology challenge teacher education? *International Journal of Educational Technology in Higher Education*, *19*(1). https://doi.org/10.1186/s41239- 022-00375-1
50. Koh, K. T., Tan, L. Q. W., Camiré, M., Paculdar, M. a. A., & Chua, W. G. A. (2021). Teachers' and students' perceptions of factors influencing the adoption of information and communications technology in physical education in Singapore schools. *European Physical Education Review*, *28*(1), 100–119. https://doi.org/10.1177/1356336x211017949
51. Kozlova, D., & Pikhart, M. (2021). The Use of ICT in Higher Education from the Perspective of the University Students. *Procedia Computer Science*, *192*, 2309–2317. https://doi.org/10.1016/j.procs.2021.08.221
52. Lachner, A., Backfisch, I., & Franke, U. (2024). Towards an Integrated Perspective of Teachers' technology Integration: a Preliminary model and future research Directions. *Frontline Learning Research*, *12*(1), 1–15. https://doi.org/10.14786/flr.v12i1.1179
53. Liesa-Orús, M., Latorre-Cosculluela, C., Vázquez-Toledo, S., & Sierra-Sánchez, V. (2020). The Technological challenge facing Higher Education Professors: Perceptions of ICT tools for developing 21st century skills. *Sustainability*, *12*(13), 5339. https://doi.org/10.3390/su12135339
54. Lucas, M., Bem-Haja, P., Siddiq, F., Moreira, A., & Redecker, C. (2020). The relation between in-service teachers' digital competence and personal and contextual factors: What matters most? *Computers & Education*, *160*, 104052. https://doi.org/10.1016/j.compedu.2020.104052
55. Mahapatra, A., & Sharma, P. (2020). Education in times of COVID-19 pandemic: Academic stress and its psychosocial impact on children and adolescents in India. *International Journal of Social Psychiatry*, *67*(4), 397–399. https://doi.org/10.1177/0020764020961801
56. Mardiana, H. (2020). Lecturers' adaptability to technological change and its impact on the teaching process. *JPI (Jurnal Pendidikan Indonesia)*, *9*(2), 275. https://doi.org/10.23887/jpi-undiksha.v9i2.24595
57. Maurer, M. M., & Daukantaitė, D. (2020). Revisiting the Organismic Valuing Process Theory of Personal Growth: A theoretical review of Rogers and its connection to positive psychology. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.01706

58. Mendoza, A., Jr. (2022, March 30). 5 reasons teachers are hesitant to adopt technology in the classroom | My EdTech Life | Teachers on Fire Magazine. *Medium*. https://medium.com/teachers-on-fire/reasons- teachers-are-hesitant-to-adopt-technology-in-the-classroom-5ef9d48ed144
59. Mercader, C., & Gairín, J. (2020). University teachers' perception of barriers to the use of digital technologies: the importance of the academic discipline. *International Journal of Educational Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-020-0182-x
60. Mitcham, C. (2022). *Thinking through Technology: The Path between Engineering and Philosophy*. University of Chicago Press.
61. Moral, R., Perigo, C., & Legaspino, I. (2024). Influence of Master Teachers' Workload on their Time Management Skills at Don Sergio Osmeña Sr. Memorial National High School. *EIKI Journal of Effective Teaching Methods*, *2*(2). https://doi.org/10.59652/jetm.v2i2.221
62. Mokhetsengoane, S. J., & Pallai, P. (2023). Effective Teaching in the 21st Century: Investigating Barriers and Solutions from One University in Assam, India. *American Journal of Arts and Human Science*, *2*(1), 19–25. https://doi.org/10.54536/ajahs.v2i1.1390
63. Mpuangnan, K. N., & Roboji, Z. (2024). Transforming educational leadership in higher education with innovative administrative strategies. *International Journal of Educational Management and Development Studies*, *5*(2), 27–56. https://doi.org/10.53378/353054
64. Mtebe, J. S. (2019). Applying UNESCO ICT Competency Framework to evaluate teachers' ICT competence levels in Tanzania. In *Advances in higher education and professional development book series* (pp. 350–366). https://doi.org/10.4018/978-1-5225-9232-7.ch020
65. Ocak, G., & KaranfiL, B. (2021). Teachers' perceptıons of their technological competence in learning and teaching process. *Malaysian Online Journal of Educational Technology*, *9*(4), 14–30. https://doi.org/10.52380/mojet.2021.9.4.221
66. Okoye, K., Hussein, H., Arrona-Palacios, A., Quintero, H. N., Ortega, L. O. P., Sanchez, A. L., Ortiz, E. A., Escamilla, J., & Hosseini, S. (2022). Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks. *Education and Information Technologies*, *28*(2), 2291–2360. https://doi.org/10.1007/s10639-022-11214-1
67. Palvia, P., Baqir, N., & Nemati, H. (2017). ICT for socio-economic development: A citizens' perspective. *Information & Management*, *55*(2), 160–176. https://doi.org/10.1016/j.im.2017.05.003
68. Patel, H. (2025, January 21). *The 7 Greatest challenges facing Education Technology today*. WPG Consulting. https://wpgc.io/blog/the-7-greatest-challenges-facing-education-technology-today/
69. Pathiranage, A., & Karunaratne, T. (2023). Digital Capabilities of Teachers: A Comparative case study. *Journal of Higher Education Theory and Practice*, *23*(5). https://doi.org/10.33423/jhetp.v23i5.5946
70. Polly, D., Martin, F., & Guilbaud, T. C. (2020). Examining barriers and desired supports to increase faculty members' use of digital technologies: perspectives of faculty, staff and administrators. *Journal of Computing in Higher Education*, *33*(1), 135–156. https://doi.org/10.1007/s12528-020-09259-7
71. Postholm, M. B. (2020). Premises and promises for Expansive learning in teacher education. *Frontiers in Education*, *5*. https://doi.org/10.3389/feduc.2020.00041

72. Ragnedda, M., Ruiu, M. L., & Addeo, F. (2022). The self-reinforcing effect of digital and social exclusion: The inequality loop. *Telematics and Informatics*, *72*, 101852. https://doi.org/10.1016/j.tele.2022.101852
73. Rahiem, M. D. H. (2021). Storytelling in early childhood education: Time to go digital. *International Journal of Child Care and Education Policy/International Journal of Child Care and Education*, *15*(1). https://doi.org/10.1186/s40723-021-00081-x
74. Ramos, J. L., Cattaneo, A. a. P., De Jong, F. P. C. M., & Espadeiro, R. G. (2021). Pedagogical models for the facilitation of teacher professional development via video-supported collaborative learning. A review of the state of the art. *Journal of Research on Technology in Education*, *54*(5), 695–718. https://doi.org/10.1080/15391523.2021.1911720
75. Rana, K., & Rana, K. (2019). ICT integration in teaching and learning activities in higher education: a case study of Nepal's teacher education. *Malaysian Online Journal of Educational Technology*, *8*(1), 36–47. https://doi.org/10.17220/mojet.2020.01.003
76. Rasdiana, R., Mauludin, I., Yahya, A., Putri, D. E., Machrus, M. A., Marbun, M., Sholikhah, A. M., Sinusi, N. S., Fathonah, S., Salmayda, S., Pawartani, T., & Ridwan, A. (2024). Mediation of digital literacy in investigating the effect of school culture on teacher performance: Implication for educational policy. *Journal of Infrastructure Policy and Development*, *8*(12), 9117. https://doi.org/10.24294/jipd.v8i12.9117
77. Rice, A. H., & Mars, M. (2023, December 1). *Planning for effective instruction*. Pressbooks. https://pressbooks.lib.vt.edu/teachagriculture/chapter/planning-for-effective-instruction/
78. Roztocki, N., Soja, P., & Weistroffer, H. R. (2019). The role of information and communication technologies in socioeconomic development: towards a multi-dimensional framework. *Information Technology for Development*, *25*(2), 171–183. https://doi.org/10.1080/02681102.2019.1596654
79. Sanchez, J. M. P., Sumalinog, G. G., Mananay, J. A., Baguia, M. M., Goles, C. E., & Alejandro, I. M. V. (2023). Faculty's access to information and communication technologies in colleges and universities in central Visayas, Philippines. *International Journal of Information and Education Technology*, *13*(3), 468–474. https://doi.org/10.18178/ijiet.2023.13.3.1827
80. Sanchez-Carrillo, J., Cadarso, M., & Tobarra, M. (2021). Embracing higher education leadership in sustainability: A systematic review. *Journal of Cleaner Production*, *298*, 126675. https://doi.org/10.1016/j.jclepro.2021.126675
81. Scherer, R., Siddiq, F., & Tondeur, J. (2019). All the same or different? Revisiting measures of teachers' technology acceptance. *Computers & Education*, *143*, 103656. https://doi.org/10.1016/j.compedu.2019.103656
82. Schmid, M., Brianza, E., & Petko, D. (2020). Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans. *Computers in Human Behavior*, *115*, 106586. https://doi.org/10.1016/j.chb.2020.106586
83. Segbenya, M., & Anokye, F. A. (2022). Challenges and coping strategies among distance education learners: Implication for human resources managers. *Current Psychology*, *42*(31), 27694–27708. https://doi.org/10.1007/s12144-022-03794-5
84. Selwyn, N., Hillman, T., Rensfeldt, A. B., & Perrotta, C. (2021). Digital Technologies and the Automation of Education — Key questions and concerns. *Postdigital Science and Education*, *5*(1), 15–24. https://doi.org/10.1007/s42438-021-00263-3

85. Seufert, S., Guggemos, J., & Sailer, M. (2020). Technology-related knowledge, skills, and attitudes of pre- and in-service teachers: The current situation and emerging trends. *Computers in Human Behavior*, *115*, 106552. https://doi.org/10.1016/j.chb.2020.106552
86. Shepherd, C. (2022). A teacher's guide to copyright, fair Use, and Creative Commons in the United States. *Journal of Technology-Integrated Lessons and Teaching*, *1*(1), 10–22. https://doi.org/10.13001/jtilt.v1i1.6995
87. Staddon, R. V. (2020). Bringing technology to the mature classroom: age differences in use and attitudes. *International Journal of Educational Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-020-00184-4
88. Swan, K., Whiteside, A. L., Dikkers, A. G., & Gunawardena, C. N. (2023). Social presence in online learning. In *Routledge eBooks*. https://doi.org/10.4324/9781003447023
89. Tican, C., & Deniz, S. (2018). Pre-service Teachers' Opinions about the Use of 21st Century Learner and 21st Century Teacher Skills. *European Journal of Educational Research*, *volume–8–2019*(volume8- issue1.html), 181–197. https://doi.org/10.12973/eu-jer.8.1.181
90. Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2022). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and Information Technologies*, *28*(6), 6695–6726. https://doi.org/10.1007/s10639-022-11431-8
91. Tinmaz, H., Lee, Y., Fanea-Ivanovici, M., & Baber, H. (2022). A systematic review on digital literacy. *Smart Learning Environments*, *9*(1). https://doi.org/10.1186/s40561-022-00204-y
92. Vali, I. (2023). The impact of technology on collaborative learning. *European Proceedings of Educational Sciences*, *5*, 126–141. https://doi.org/10.15405/epes.23045.13
93. Van De Werfhorst, H. G., Kessenich, E., & Geven, S. (2022). The digital divide in online education: Inequality in digital readiness of students and schools. *Computers and Education Open*, *3*, 100100. https://doi.org/10.1016/j.caeo.2022.100100
94. Venketsamy, R., & Hu, Z. (2022). Exploring challenges experienced by foundation phase teachers in using technology for teaching and learning : a South African case study. *Journal for the Education of Gifted Young Scientists*, *10*(2), 221–238. https://doi.org/10.17478/jegys.1085660
95. Voinea, M. (2019). Rethinking teacher training according to 21st century competences. *European Journal of Multidisciplinary Studies*, *4*(3), 20. https://doi.org/10.26417/341umm27o
96. Voithofer, R., Nelson, M. J., Han, G., & Caines, A. (2019). Factors that influence TPACK adoption by teacher educators in the US. *Educational Technology Research and Development*, *67*(6), 1427–1453. https://doi.org/10.1007/s11423-019-09652-9
97. Vyas-Doorgapersad, S. (2022). The use of digitalization (ICTs) in achieving sustainable development goals. *Global Journal of Emerging Market Economies*, *14*(2), 265–278. https://doi.org/10.1177/09749101211067295
98. Weidlich, J., & Bastiaens, T. J. (2019). Designing sociable online learning environments and enhancing social presence: An affordance enrichment approach. *Computers & Education*, *142*, 103622. https://doi.org/10.1016/j.compedu.2019.103622
99. Wilson, M. L., Ritzhaupt, A. D., & Cheng, L. (2020). The impact of teacher education courses for technology integration on pre-service teacher knowledge: A meta-analysis study. *Computers & Education*, *156*, 103941. https://doi.org/10.1016/j.compedu.2020.103941

100. Žalėnienė, I., & Pereira, P. (2021). Higher Education for Sustainability: A Global perspective. *Geography and Sustainability*, *2*(2), 99–106. https://doi.org/10.1016/j.geosus.2021.05.001