

# Teachers' Information and Communication Technology (ICT) Competence and Perception towards Effective Teaching

Christopher Ramos, Maylene R. Pamablan

Divine Word College of Bangued

DOI: <https://doi.org/10.51584/IJRIAS.2026.11070130>

Received: 29 July 2026; Accepted: 03 August 2026; Published: 11 August 2026

## ABSTRACT

This study assessed the Information and Communication Technology (ICT) skills and perceptions of teachers in the Higher Education Institutions (HEIs) of the Province of Abra offering Teacher Education Programs during the school year 2024–2025. It examined the profile of the respondents and their levels of competence across six ICT domains along ICT Basic, Word Processing, Spreadsheets, Presentation, Information Communication, and Computer Ethics and Security. Utilizing descriptive research design, a survey questionnaire was used to gather data from the 74 full-time teachers. The data gathering instrument was adopted from Regañon (2024) and Dela Fuente and Biñas (2020). The data gathered were analyzed using frequency, percentage, weighted mean, t-test, and ANOVA. Findings revealed that the respondents are predominantly affiliated with public HEIs largely composed of seasoned teachers and belong to Generation X. In terms of ICT competence, teachers show proficient competency in ICT basics, word processing, computer ethics and security and information and communication, and advanced competency in spreadsheet and presentation. While they demonstrate proficiency in operating a computer, technical gaps were identified in troubleshooting and creating formulas in spreadsheets. The perception of ICT integration was found to be positive as it enables students to be more engaged in learning, improves the quality of teaching, and enhance teaching with more updated materials. No significant difference was found in ICT skills based on type of institution ( $p = 0.72$ ), however, significant differences exist as to the years of service ( $p = 0.01$ ) and generation ( $p = 0.02$ ). The ICT competence of teachers and their positive perception of the ICT integration is necessary in this evolving digital landscape in education. Hence, the provision of ICT development should be ensured across different ICT domains to keep teacher more competent and responsive to the needs and demand of 21st century learners as emphasized in the TPACK framework.

## BACKGROUND OF THE STUDY

The capacity of Information Communication and Technology (ICT) to transform the world into a better place is limitless (Marcial & de la Rama, 2015; Rathee & Saini, 2022; and Khashkhuu, 2017). This claim has been emphatically mentioned by several organizations underscoring the capacity of ICT in imposing significant impact in today's society. The United Nations Development Programme (UNDP) in 2001 stressed how imperative ICT was when they included it as one of the themes and priorities in the international communities. The Asian Development Bank (ADB) in 2015 also reported that ICT has a very strong potential in reducing poverty both in Asia and in the Pacific (cited in Altinay, 2019).

In addition, ADB highlighted several components like assessment, e-learning system development, and training. Similarly, the World Bank (WB) has also promoted access and use of ICT to mitigate economic losses, and services improvement, and good governance promotion in line with accountability. All are addressed in one of the pillars of its program which focuses on competence development, and ICT applications usage particularly, like education (Marcial & de la Rama, 2015). ICT is an effective tool to ensure that Higher Education Institutions (HEIs) address global competitiveness, through ICT integration in the curriculum, it is guaranteed that graduates have good digital fluency in response to the modern world (Hermawan et al., 2018).

Uzbekistan schools has been highly responsive to ICT integration in education while addressing the needs and demands of the 21<sup>st</sup> century learner (Qizi Nasirdinova & Minamatov, 2022). In the same way, Foutsitzi and

Caridakis (2019) cited that across Europe, ICT integration in education has helped teachers impose high motivation to young learners. Additionally, Hermawan et al. (2018) in his study underscored the inevitable imperative role of ICT in education in enhancing learners' micro skills. It was further emphasized that if ICT is properly applied in education, learning targets by the teacher will be easier to achieve.

In the Asia Pacific, the study of Ra and Lim (2016) underpinned the capacity of ICT to address key educational challenges such as quality, equity and efficiency. Meanwhile, Liang et al. (2022) point out the high potentials of ICT to provide learners with equal opportunity to learn complex concepts into much easier manner. Slechtova (2015) found learners towards ICT as highly overwhelming as they look at ICT as integral part of their lives as students. Similarly, the Program for International Student Assessment (PISA) report ICT plays a vital role in a successful attainment of the goals of the K-12 curriculum in the Asia-Pacific countries (ErümiT & Keleş, 2021). Globally, ICT aids in education particularly in sustaining learners' motivation, learners' skills enhancement, teachers' preparation and delivery (Saif et al., 2022). In 2018, ICT in education positively impacts the education in 121 countries (Alhassan & Adam, 2021).

ICT integration in education is a trend that needs to be given emphasis. It is something curriculum implementors should prioritize due to its high demands in developing 21<sup>st</sup> century learners (Hinostroza, 2017). Bhattacharjee and Deb (2022) described ICT integration in education as a must. They further claimed that the current generation are learners who seek for ICT integration in the teaching and learning process because this makes learning more meaningful to them. According to Shoraevna et al. (2021), using technology nowadays is no longer a privilege but a necessity, thus teachers should keep themselves abreast with the basic competence in ICT, in this manner they do not only become excellent but also responsible teachers in the 21<sup>st</sup> century.

There have been various studies highlighting the need of ICT integration in education worldwide. ICT is not just anything in education, it is something that all school heads, teachers, school benefactors, and students should be dealing with seriously (Budhedeo, 2016; Mubinakhon & Anaskhon, 2021; Fernández-Gutiérrez et al., 2020; Gil-Flores et al., 2016). In Laos and in Malaysia, the ICT integration had one of the highest demands in education (Krishnasamy et al., 2022). In the same study, it was identified that to leverage the quality of education in rising countries, one of the solutions is to enhance the quality of education through meeting the trends such as ICT integration in education. With the development of internet technology, a study in Saudi Arabia schools observed a significant shift in traditional classrooms to digital classrooms. In addition, they identified that classrooms should be equipped with a wealth of ICT tools, and teachers should be trained and should have significant progress in integrating digital technology to improve students' access to information and cooperative learning opportunities (Alenezi et al., 2023).

Rathee and Saini (2022) furthered the impact of ICT integration in teaching where they stressed that student teachers are greatly influenced by their teachers. This has a strong relevance to the Barron and Goldman's (cited in Rathee & Saini, 2022) claim what educational reformers have long noted that teachers teach as they were taught. This is significantly imposing that to encourage the use of educational technology as a tool for learning, teachers in the HEIs should also be literate in integrating different ICT tools in their teaching and learning process (Khatua, 2012; Siddiquah & Salim, 2017). However, ICT use in education can be challenging for some teachers particularly those who are in Higher Education Institutions (HEIs) offering teacher education that belong to a generation where technology was not so rampant and had not been a prime factor for learning (Rathee & Saini, 2022). Other than this is the lack of infrastructure, insufficient training, and limited access to ICT resources (Vidal & Ahmad et al., 2019, cited in Toguina, 2024).

Integrating ICT in teaching skills and knowledge to students is highly demanded (Lawrence & Tar, 2018). In the reforms of education system, particularly on ICT integration in the teaching and learning process, teachers are at the core of concern whether or not they have enough technological knowledge (Wang & Dostál, 2017). The demand for teachers to integrate ICT in teaching is an apprehension that has to be strategically addressed especially when teachers' acceptance to ICT integration in teaching is low (Lawrence & Tar, 2018; Wang & Dostál, 2017). Ounis (2016) underscored that teacher's integration of ICT in teaching is greatly affected by the gap in generation between them and their students. He further emphasized that teacher's training play a pivotal role towards their regressive attitude towards the integration of technology. Similarly, Albion et al. (2015) highlighted that teachers who are tasked to integrate technology graduated from a curriculum that are not

aligned with ICT use in teaching, thus, he proposed that for a meaningful integration of technology along with pedagogy and content knowledge, teachers should have a proper understanding of technological knowledge and how they may be used towards effective teaching.

Moreover, Heitink et al. (2017) in their study explored how technological knowledge affects the pedagogical and content knowledge of the teachers towards effective teaching. They underscored that technological knowledge is as important as pedagogical and content knowledge. This implies that teachers should be educated about technological importance along with its applicability in the teaching and learning (Seufert et al., 2020). Furthermore, Scherer et al. (2017) underscored that in today's rapidly evolving educational landscape, technological knowledge is no longer optional, it is now essential. Effective teaching goes beyond mastering content and pedagogy as it demands an integration of technology to enhance learning experiences, foster engagement, and prepare students for a digital-driven world (Saubern et al., 2019). Saubern et al. (2019) further claimed that without technological proficiency, even the most well-versed educators risk falling behind, limiting their ability to connect with and empower 21st-century learners. True educational excellence lies in the seamless fusion of content knowledge, pedagogical strategies, and technological innovation to create dynamic, inclusive, and future-ready classrooms (Bingimlas, 2018).

Majumdar (2006) (as cited in Implementation of Ict Skills For The Students For Their Employment In Skill Based Jobs, n.d.) highlighted that ICT has a very high potential to transform the education into better landscape. Though being literate means being familiar with literature or being well educated, learned as defined by UNESCO (2006), literacy is continuously evolving, derived from conceptions of print literacy and related media (Gutierrez & Vidal, 2012 cited in Khashkhuu, 2017). Today the meaning has been extended to incorporate practices mediated by technologies (Belshaw, 2011 cited in Khashkhuu, 2017). It is possible to produce future generation teachers who can maximize the advent of ICT, but it will only be possible if teachers who are teaching these aspiring teachers are literate enough to use and integrate technology in their daily lessons setting as role models for the students (UNESCO, 2002). Jadhav (2011) also pointed out that the quality of teacher education graduates highly depends on the quality of teachers teaching them, which in turn depends on the quality of teacher education.

Maurer et al. (2011) as cited in Okigbo and Enemuoh (2021) defined technology literacy as the ability to manipulate software and hardware. In addition, Okigbo and Enemuoh (2021) also cited the work of Adeyinka and Mutala (2008), where they mentioned that computer literacy includes basic knowledge about computer particularly, the use of Microsoft PowerPoint, operating Internet connectivity, word processing, excel functions, and uploading and downloading documents among others. Similarly, Lim and Chai (2007) also highlighted that technology literacy may include skills in digital lay outing and video editing, both of which are essential competence toward ICT integrated meaningful and engaging teaching and learning. In addition, Majumdar (2006) stressed that ICT in education is at least of four phases: the emerging phase where both the teachers and the learners are being aware of the advent of ICT in the teaching and learning process; the applying stage where both learners and the teachers integrate ICT tools in the process; the infusing stage where teachers` role and the administrators ensure the alignment of the use of ICT in the curriculum; the transforming phase where teachers and those concerned conduct assessment and evaluation to come up with innovation towards new ways of teaching using ICT.

Integrating technology in the teaching and learning helps a teacher come up with a learning environment which the students find joy while having fruitful learning (Nabeel et al., 2022 cited in Implementation of ICT Skills for The Students for their Employment In Skill Based Jobs, n.d.). They further pointed out that ICT integration in the teaching and learning process has become a catalyst for change as it leverages the potential impact of education on the learners` lives. Mastery of the ICT competencies by teachers teaching in teacher education is an imperative requirement for teaching and learning (Ferrari et al., 2014; Tondeur, 2018; UNESCO, 2017). Several studies prove that competencies in the use of ICT as defined by UNESCO, 2016 when met effectively results to an effective teaching and learning process including pedagogies, and subject learning across different domains (Koehler et al., 2013; UNESCO 2017). In addition, Buabeng-Andoh (2012) cited in Dela Fuente and Biñas (2020) foregrounded that to successfully utilize technology in educational reforms, teachers must have strong support and attitude towards the integration of ICT in education. Teo (2011) also pointed out that

teachers' belief and attitude towards ICT as well as their perceived barriers to integration, constitutes as important factors to their actual use of ICT. Altınay (2019) also emphasized that technology is a very useful tool that can be utilized to address the learning gaps in this day's generation. Vrasidas and McIsaac (2001) in their study of the education system in Cyprus public schools, placed emphasis on policy and curricular reform as they relate to the use of technology integration for teacher education.

Teacher education is an equal blend of teaching style, pedagogy, curriculum, teachers, learners, and infrastructure (Rathee & Saini, 2022). As the imperative role of teacher education systems in nation building through its clients-the teacher education students are emphasized, Pradhan (2018) also stressed that to realize this benefit, teacher education systems should be revitalized and strengthened. In the study, it was mentioned that one of the key factors that would allow the teacher education system to be more attentive to the demand of this fast-changing era is to dive into innovations responsive to the demand of the technological era. Due to globalization and the effect brought by the information technology revolution, the teacher education systems should be adaptive to technological changes, such as restructuring curriculum, realigning pedagogies, and enhancing technological literacy among others (Pradhan, 2018).

Several studies also present challenges of ICT in the teaching and learning process (Budhedeo, 2016; Fernández-Gutiérrez et al., 2020; Fu, 2013 cited in Dela Fuente & Biñas, 2020; Mubinakhon & Anaskhon, 2021;). Al-Bataineh et. al. (2018) stressed that one of the possible factors that might affect ICT integration is teachers' low expectation and unclear ICT goals in schools (cited in Dela Fuente & Biñas, 2020). It is underscored that teachers' lack of experience, collaboration, strategic support among fellows in the field (Sarkar, 2012). The inadequacy of mastery of integration of ICT competence in education remain a concern (Alkahtani, 2017).

In a study presented by Scherer et al. (2017), support from the school's administration is a huge factor in terms of the presence of ICT tools. In addition, the type of HEI has a great impact to teachers' competence specifically in aspects that involves infrastructures (Mallillin & Mallillin, 2019). Furthermore, the study of Nunes-Silva et al. (2019) showed that highly developed private higher education institutions tend to be more equipped with ICT tools that can be utilized in teaching, significantly impacting their skills in ICT integration in the curricula. Afridi and Chaudhry (2019) highlighted that ICT integration in the curriculum is greatly affected by the type of HEI, as public schools often lack infrastructure due to high number of enrollments as compared to private higher education. In the Philippines, the integration of ICT into higher education institutions (HEIs) exhibits notable disparities between public and private establishments.

A study focusing on Central Visayas revealed that, despite the potential of ICT to enhance student-centered learning, its pedagogical integration among teacher educators remains moderate. This study encompassed 383 responses from 76 private and public HEIs, indicating a general underutilization of ICT resources in teaching methodologies (Pagal, 2017). Further research highlights that while both public and private HEIs face challenges in ICT integration, private institutions often have more access to resources, enabling better implementation of technology in educational practices, while public HEIs frequently encounter budget constraints, limiting their capacity to adopt and integrate advanced ICT tools effectively (Crisolo, 2018).

Moreover, Alazam et al. (2012) presented that there was a statistically significant difference of ICT competence among the four years of teaching categories: below 10 years; 11 to 18 years; 19 to 26 years; 27 to 34 years. Similarly, the studies of Mahmud and Hj. Ismail (2010) and Fernández-Cruz and Fernández-Díaz (2015) presented that teachers who have been in the teaching profession for longer years have been provided with training and support to cope with the demands in curriculum change.

Aside from the length of years that a teacher has been in service, Fernández-Cruz and Fernández-Díaz (2015) in their study presented that generation group of teachers are also significant factors affecting the ICT competence of teachers. Salleh et al. (2023) found that there is significance of teachers' generation group in the level of ICT competence of teachers. Similarly, Pegler et al. (2010) mentioned that younger teachers demonstrate noticeable confidence and a higher potential for technology integration in contrast to their older colleagues. Generations are classified into eight categories, these are: (a) the Greatest Generation (GI Generation, 1901–1927), (b) the Silent Generation (1928–1945), (c) Baby Boom Generation (1946–1964), (d)

Generation X (1965–1980), (e) Millennial Generation or Generation Y (1981–1996), (f) Generation Z or iGen (1997–2010), (g) Generation Alpha (2010–2024), (h) Generation Beta (2025–2039), each of the generation perceive matters differently (Cottrell, 2024).

This clearly shows that to meet expected outcomes from teachers teaching in teacher education institutions should be supported in various aspects as assessed by the ICT Competency Level of Teachers (Koh & Divaharan, 2011; Regañon, 2024). As various researches also underscored that one of the major reasons that challenges teachers in integrating technology is their acceptance of ICT usage in the classroom (Aud et al., n.d.; Capan, 2012; Dudeney & Hockly, 2012). Moreover, Casim and Obono (2012) identified in their study that the correlation of teachers' belief and the use of ICT is high.

According to Summak and Samancioğlu (2011), issues of ICT integration in the teaching and learning process may be addressed if school administrators alongside policymakers take them seriously. With the fact that teachers should not only be taught how to use ICT tools to augment or alleviate traditional teaching but also be skilled in integrating ICT in the teaching and learning process to motivate, engage, and foster deep-rooted connection with the students towards meaningful learning (Tezci, 2011; Tondeur et al., 2018). If ICT is excellently integrated in education, it will create a proactive teaching and learning environment (Altakhynéh & Abumusa, n.d.; Arnseth & Hatlevik, 2010; Lubuva et al., 2022). However, ICT integration in education is challenging especially to teachers who are the primary implementers of the curriculum and the sole instruction makers, because despite being in the technology era, they still lack acceptance as specified in the UNESCO 2006 assessment report (Aslan & Zhu, 2015; Paudel 2021; Hennessy et al., 2005). Technology integration has challenges that need to be addressed, such as teacher's low expectation and unclear goals for ICT in schools (Al-Bataineh et al., 2008), lack of teacher's experience, collaboration and pedagogical support among colleagues (Ertmer & Ottenbreit-Leftwich, 2010), and the inadequacy of time to master the integration of ICT competence in education (Almeqdadi, 2010).

Additionally, Ghavifekr and Rosdy (2015) also underpinned in their study the vital support provided by free software available to be utilized by teachers such as Microsoft package. They further highlighted that the six core components of Microsoft Office, notwithstanding the added One Drive and SharePoint design tool, can be a powerful tool in the teaching and learning. The Word, Excel, PowerPoint, Publisher are often used by a variety of users like teachers, students, office staff, but in contrast, some may frequently use it, or never use it at all (Regañon, 2024). In a comparative study done by Ogwu and Ogwu (2016), Microsoft package (MSP) such as word, excel, spreadsheet, presentation, and publisher were identified as essential skills in delivering a meaningful learning especially to the learners of the technological generation. They further mentioned that teachers' competence in integrating them in teaching needs to be noticed by the administrators to cope with the demands of the shifts in the education systems. In addition, the study of Gusen and Gusen (n.d.) pointed out in their findings that basic competence in MPS is significant in meeting excellence in the teachers' workplace. Similarly, a study conducted by Elsa and Anwar (2021) presented the importance of teachers' skill in utilizing lay outing tools, concurrently, Elsa and Anwar (2021) and Fitri and Efendi (2024) claimed that visuals in the classroom, can serve several purposes, including creating abstract ideas, motivating students, giving direct attention to learners, easier recall of learning and effective learning.

ICT integration in the classroom is a complex and serious matter as far as academic instruction is concerned (Hero, 2020). In the study of Ramirez-Montoya et al. (2017) as cited in Hero (2020), and Ngao et al. (2022), teachers' preparedness to use ICT in the teaching and learning, along with their competence to use them are central and identified to be a core element for teachers to come up with strategies, pedagogies, and methodologies, and instructional materials that are responsive to the learners' needs and demands. Moreover, it is imperative that teachers have at least high acceptance of technology integration in the teaching and learning process to ensure that its integration is successful and flourishing (Pultoo et al., 2020 cited in Hero, 2020; Ngao et al., 2022). Hero (2020) and Pardo (2012) in their studies further cited that ICT acts as a catalyst that promotes multidimensional ways of facilitating learning, fostering and engaging interaction between the teacher and the students. The rise of artificial Intelligence (AI) is also a good tool when used properly to enhance learning outcomes (Harry & Sayudin, 2023).

In their study, Instefjord and Munthe (2017) shed light to the fact that teachers' acceptance belief influences their attitude about a certain matter including their perceived level of preparedness. In addition, Rokenes and Krumsvik (2016) revealed that there is a significant correlation between teachers' preparedness and technology integration in the classroom. In order to successfully integrate ICT in the teaching and learning process, teachers must cooperate to its implementation with full preparation and acceptance (Roblin et al., 2018; Hero, 2020).

In today's era, education is a fortress of the global economy, according to the book, Education in South East Asia, education must be seen as a vital social device for global transformation. Macapugas et al. (2023) emphasized that ICT tools in education must be taken vitally to alleviate the quality of education. In the 1987 Philippine Constitution, it was emphasized that the state shall promote quality basic education to all the members of the society. This is furthered by the Governance Act of 2001 which made basic education compulsory to all Filipino children. In the report during the 5<sup>th</sup> National Coordinating Council of Private Educational Associations (COCOPEA) Congress, the Philippines ranked 6<sup>th</sup> out of the ten South East Asian countries in the Global Competitiveness Report (Luz, 2021). Given this basis, the education system in the Philippines has long been a national concern. As Luz (2021) reported, one recommendation to address the result of the global competitiveness is to give educational processes with pedagogies responsive to the needs of the 21<sup>st</sup> century Filipino learners.

The role of ICT in education even became more crucial during the COVID-19 pandemic. Information and Communication Technology (ICT) emerged not merely as a modern convenience, but as an imperative alternative approach to ensure pedagogical continuity amidst unprecedented disruptions. For higher education institutions, the sudden shift to online learning became a complex endeavor contingent upon the interaction between technological availability such as reliable internet and infrastructure, and the strategic implementation of Learning Management Systems (LMS). Because of the pandemic, education landscape has shifted to distance learning where both teachers and students highly relied on ICT advancements (Ansi & Fatmawati, 2023). Ober et al. (2025) highlighted that ICT has high potential to sustain and enhance educational outcomes. Meanwhile, the national population survey conducted to both private and public basic education schools by the Philippine Education system by SEAMEO INNOTECH Philippines revealed that only 14.28% of the 45, 811 schools across the sixteen regions of the Philippines claimed that they have hardware ready to be used by both teachers and students.

ICT integration in higher education curricula is increasingly facilitated through strategic partnerships between academic institutions, industry leaders, and governmental bodies. These collaborations aim to enhance educational outcomes, align academic programs with industry needs, and promote technological advancement within educational settings (Strengthening Higher Education-school Partnerships for Green and Digital Innovation, 2023). Government agencies often collaborate with HEIs to promote ICT integration. The Commission on Higher Education (CHED) and the Department of Information and Communications Technology (DICT) signed a memorandum of understanding to integrate technological solutions into higher education through e-governance systems (Cabato, 2023).

In the Philippines, the integration of technology was already highlighted in the Restructured Basic Education Curriculum (RBEC) aimed to implement an interactive curriculum that allows interdisciplinary teaching, contextual, and authentic learning. Meanwhile, supporting the aim of Philippine Education System to enhance quality in education, the K to 12 curricula, has had its way to adopt a revised version of the National Competency-Based Teacher Standards (NCBTS), a framework which has guided the implementation of education in long years– the Philippine Professional Standards for Teachers (PPST) (Castro, 2018).

The national adoption and implementation of the Philippine Professional Standards for Teachers (PPST) also known as the DepEd Order No. 42, s. 2017 was approved by DepEd Secretary Leonor M. Briones to continuously improve the quality of teachers in the Philippines (Mateo, 2018 cited in Castro, 2018). Castro (2018) further discussed that the PPST was made out from the NCBTS to complement the improvement initiatives on the quality of teachers from pre-service to in-service education as technology integration in the teaching has been given emphasis. In response to this, CHED also has made its step in restructuring the curriculum for teacher education allowing them to integrate Education Technology Courses to the Teacher

Education Programs. In Addition to this, HEIs were also required to implement courses that align with modern technology, particularly the course Living in the IT Era.

In line with the curriculum, the goal of the Philippine Education Technology Plans (PETP) targeted the provision and existence of appropriate educational technology packages in public secondary schools, computer laboratory rooms, electronic library systems, and appropriate training to teachers on basic computer literacy and workshops on the use of internet and computer-aided instruction. With such importance of ICT integration in the teaching and learning, the trend of curriculum transposes the ideals of meeting the demand of the 21st century learning (Bonifacio, 2018). Cottrell (2024) also highlighted that the same problem is encountered in tertiary schools, due to most teachers are seasoned and have not been provided opportunities for training and competence development in ICT use in the classroom.

Towards the attainment of the SDG 4 of the United Nation particularly on its intention to improve quality of higher and technical education and research for equity and global competitiveness, the Philippines has core organizations that lead in addressing related issues (Rubio & Saenz, 2023). With the gaps in Philippine education system as a concern of various organizations, the Commission on Information and Communication Technology (CICT) is in charge to oversee the integration of ICT in the educational system particularly in the teaching and learning process. Along with CICT, other organizations, namely the Philippines Qualification Framework (PQF) which is composed of the Department of Education (DepEd), Technical Education and Skills Development Authority (TESDA), Commission on Higher Education (CHED), the Professional Regulation Commission (PRC) and the Department of Labor and Employment (DOLE) are also concerned with the Philippine Education System and focused on the improvement of education in the Philippines. Their primary aim is to address gaps in the education by providing training, and avenues for professional growth. Furthermore, they align the national training programs with international standards (Diagnostic Assessment Report – Philippines Country Report, 2022).

The rapid advancement of ICT has transformed various sectors, including education. The DepEd, the CHED, and the Department of Information and Communications Technology (DICT) have developed ICT standards to ensure the effective integration of digital tools in teaching and learning. These standards provide a framework that guides educators in leveraging ICT to improve pedagogical strategies, learning engagement, and overall educational outcomes (Vicerra et al., 2012).

Relevantly, Republic Act 8981 or Philippine Regulatory Commission (PRC) monitors the performance of HEIs and ensures the global competency and modernization of teaching interventions by teachers in the Philippines and uplifts their performance for professional strategy particularly in ensuring digital competence of the graduates (Quimbao et al., 2015). Furthermore, they underscored that PRC's inclusion of Educational Technology in the board exam questions is an implication of strong support towards the integration of technology in the teaching and learning.

In response to the report, the CHED alongside with the Philippine Association for Teachers Education (PAFTE) conducted curriculum restructuring which demands superior technology integration to teacher education courses. With this, Educational Technology courses has given emphasis to meet such demands of learners of the technology era. The integration of educational technology courses has compelled teachers to develop future educators who are ready to emerge themselves in the potentials of technology in various aspects such as new learning pedagogies, strategies, instructional material development, and instruction (Balajadia, 2015).

Hero (2020) underscored in his study that higher education institutions offering Teacher Education Programs are responsible for providing the qualifications to the teacher education graduates which includes technological literacy in their entry as beginning teachers. Teachers should further be regarded as vital factors for they themselves are responsible for implementing a curriculum enhanced and integrated by technology (Hero, 2020). In the Province of Abra, there has been a very limited study exploring the level of ICT competence of teachers teaching in the teacher education programs and their perception of ICT integration in teaching. In Divine Word College of Bangued where the researcher is affiliated as an instructor of the Teacher Education Program, there is no study yet exploring the teachers' level of ICT skills and perception of integrating ICT in

teaching. In the lens of a huge number of studies highlighting the need of ICT integration in teaching towards effective teaching, ICT competence of teachers who are teaching teacher education programs should be a core of analysis to ensure that SDG 4 particularly on ensuring quality education is targeted and attained. To address this and to ensure that tertiary schools in the Abra who are offering teacher education programs are competent in employing effective teaching, the researcher upon considering the related studies, have decided to explore the teachers' level of ICT competence and their perception of ICT integration in the teaching and learning.

Interestingly, the exponential growth in technology has greatly impacted learning and therefore emphasizes the importance for the teachers to acquire and implement the Information and Communication Technology (ICT) skills into their lessons. However, despite the clear benefits of ICT in education, there remain considerable learning gaps in the Philippines that hinder effective technology integration. Teachers play a crucial role in education reform, yet many struggle with ICT integration due to inadequate training, low acceptance rates, and a generational gap between them and their students (Ounis, 2016; Wang & Dostál, 2017). Since many educators were trained in curricula that did not emphasize ICT, they often lack the necessary technological proficiency to engage 21st-century learners (Albion et al., 2015; Heitink et al., 2017). Without sufficient ICT knowledge, teachers risk falling behind, limiting their ability to adapt to digital instruction (Bingimlas, 2018; Saubern et al., 2019; Scherer et al., 2020).

Considering the gaps in the literature presented, this study aims to address these by assessing the ICT competence of teachers and their perception of ICT integration in teaching, specifically in Teacher Education programs in the Province of Abra. By investigating these aspects, this research seeks to provide insights that will inform strategic interventions for enhancing ICT competence among teachers, ensuring that they are equipped to deliver effective and technology-driven instruction.

## **Conceptual Framework**

The integration of Information and Communication Technology (ICT) in education necessitates a multidimensional understanding of how technology intersects with pedagogy and content knowledge. One of the most comprehensive models that encapsulate this dynamic relationship is the Technological Pedagogical Content Knowledge (TPCK) framework, originally developed by Koehler (2006). TPCK extends Shulman's (1986) notion of Pedagogical Content Knowledge (PCK) by incorporating Technological Knowledge (TK) as a critical domain, thereby addressing the complexities of technology integration in teaching and learning.

The Technological Pedagogical Content Knowledge (TPCK) framework offers a comprehensive model for effective teaching by examining the dynamic interplay between three foundational domains: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). Technological Knowledge encompasses an educator's proficiency with ICT applications and emerging digital tools; according to Tribble & PowerSchool (2025), TK is a fundamental pillar that allows teachers to move beyond mere hardware familiarity to create inclusive, student-centered environments through simulations and multimedia. Pedagogical Knowledge serves as the instructional foundation, covering classroom management and assessment strategies. As Kurt (2019) emphasizes, PK is essential for ensuring that ICT is integrated purposefully rather than superficially, acting as the transformative force that aligns digital resources with active student engagement. Finally, Content Knowledge provides the necessary subject-matter expertise, ensuring that all information delivered is accurate and contextually relevant. Together, these domains form a layered approach where CK provides the core substance, PK dictates the method of delivery, and TK enables innovative, 21st-century learning experiences.

In a rapidly evolving landscape, the interaction between Content Knowledge (CK) and ICT integration prepares students for modern complexities. Educators with deep subject expertise can leverage digital tools to integrate real-world data and current research, fostering critical thinking and interdisciplinary learning. This balanced competency across CK, PK, and TK ensures that teaching remains relevant and engaging for the digital generation, ultimately delivering enriched learning experiences that allow students to thrive (Schmidt et al., 2009).

The TPACK framework further conceptualizes the intersections of these core domains, giving rise to three specialized areas of knowledge. Technological Content Knowledge (TCK) involves leveraging technology to represent specific subjects through innovative means like simulations and data visualization. Technological Pedagogical Knowledge (TPK) reflects an educator's ability to select tools that support varied instructional strategies, such as collaborative learning and differentiated instruction. Meanwhile, Pedagogical Content Knowledge (PCK) represents the expertise in aligning specific teaching methods with subject-matter objectives to ensure information is both comprehensible and sound (Adams, 2019).

At the heart of these intersections lies TPACK itself, a deep, situated understanding of how technology, pedagogy, and content interact dynamically. This integrative model underscores that effective ICT integration is not about using technology in isolation, but about mastering the interconnectedness of these domains. By developing this multifaceted fluency, educators can navigate the complexities of digital-age teaching while effectively optimizing student learning outcomes. In line with this study, the level of ICT competence of teachers in teacher education programs and their perception of ICT integration is crucial in the teaching-learning process. The TPACK framework is instrumental in conceptualizing the competencies required for meaningful technology integration in teacher education, as it highlights the necessity for teachers to develop a holistic knowledge base that encompasses technology, pedagogy, and subject matter expertise.

The operational paradigm of the study delineates the relationship between the input, process, and the output of this research study as illustrated in the Figure 1. The research paradigm shows that the input consists of the profile of the teachers teaching teacher education programs along the type of HEI, years of teaching, and generation. It also includes the level of ICT competence of teachers in terms of the National Information Communication Technology Standards (NICTS) which includes six skill set divisions namely ICT basics, word processing, spreadsheet presentation, information and communication, and computer ethics and safety. Also included in the paradigm's input is the perception of teachers about ICT integration in teaching.

On the other hand, the process includes the analysis of information on the profile of the teachers teaching in the teacher education programs in the Province of Abra along: type of HEI, years of teaching, and generation; the information on level of their ICT competence in terms of: basic Microsoft Word Processing, basic Microsoft PowerPoint Presentation, basic Microsoft Excel Spread, basic Microsoft Publisher, basic Video Editing, utilizing online resources, and using Canva applications; and the information on their perception of ICT integration in teaching. It also includes the significant difference between the ICT competence of teachers as to their profile. Meanwhile, under the output are the databank of the profile of the teachers teaching in teacher education programs in the Province of Abra; enhanced ICT competence; enhanced perception on the integration of ICT in teaching towards effective teaching.

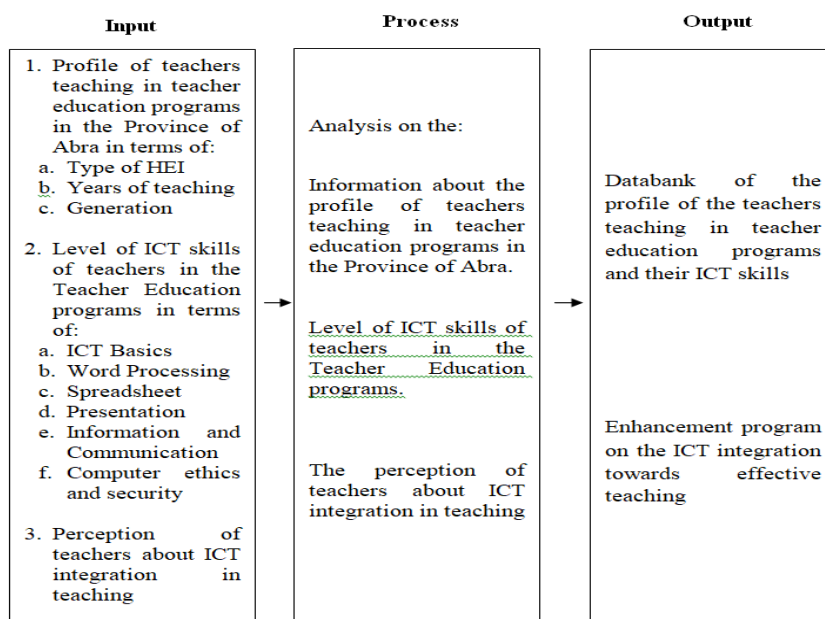


Figure 1. Research Paradigm

---

## Statement of the Problem

This study aimed to identify the level of ICT competence of the teachers teaching teacher education programs in the Province of Abra and their perception of integrating ICT towards effective teaching for School Year 2024-2025. The study particularly sought to find answers to the following questions:

1. What is the profile of teachers teaching in the Teacher Education Programs in the Province of Abra in terms of:
  - a. Type of HEI,
  - b. Years of teaching, and
  - c. Generation?
2. What is the level of ICT competence of teachers in the Teacher Education programs in terms of:
  - a. ICT Basics,
  - b. Word Processing,
  - c. Spreadsheet,
  - d. Presentation,
  - e. Information and Communication, and
  - f. Computer ethics and security?
3. What is the perception of teachers about ICT integration in teaching?
4. Is there a significant difference on the ICT competence of teachers when grouped according to their profile?
5. What enhancement program can be implemented to improve teachers` ICT integration and perception towards effective teaching?

## Null Hypothesis

There is no significant difference between the teachers` level of ICT competence as to the profile of the teachers along type of HEI, years of service, and generation.

## Scope and Delimitation

The respondents of this study comprised of 74 full-time faculty members teaching in Teacher Education Programs (TEPs) within the Province of Abra during the second semester of the School Year 2024–2025. These participants were drawn from the four key institutions in the province, namely the Abra State Institute of Sciences and Technology (ASIST) – Main Campus, ASIST – Bangued Campus, Abra Valley Colleges (AVC), and the Divine Word College of Bangued (DWCB). The study evaluated their ICT competence across six core competencies, ICT basics, word processing, spreadsheets, presentations, information and communication, and computer ethics and security.

## Significance of the Study

The integration of Information and Communication Technology (ICT) in education has transformed the teaching and learning landscape, necessitating that educators develop a high level of digital competency. Its

significance extends across multiple stakeholders, including teacher educators, pre-service teachers, educational institutions, curriculum developers, and policymakers.

**Teacher Educators.** This study provides empirical data on the current ICT competency levels of teacher educators, highlighting strengths and potential areas for professional development. By understanding their technological proficiency and pedagogical application of ICT, teacher educators can enhance their instructional strategies, ensuring that they effectively integrate digital tools to facilitate meaningful learning experiences.

**Pre-Service Teachers.** The findings of this study contribute to the improvement of teacher education curricula, ensuring that pre-service teachers receive adequate exposure to technology-enhanced pedagogies and are prepared to integrate ICT effectively in their future classroom

**Educational Administrators.** This study helps them gain insights into the technological readiness of their faculty. The results can inform the development of targeted faculty training programs, resource allocation for ICT infrastructure, and policy reforms that promote the systematic integration of ICT in instructional delivery.

**Curriculum Developers.** The study provides valuable input for curriculum designers like the teachers, program heads academic officers, and deans, emphasizing the need to embed digital literacy, instructional technology, and ICT pedagogies within teacher education programs. A well-structured curriculum that aligns with global educational technology standards enhance the quality of teacher preparation and promote innovative teaching methodologies.

**Policymakers and Educational Leaders.** Policymakers and educational leaders responsible for shaping ICT policies in education can use the study's findings to formulate evidence-based policies that support technology integration in teacher education. It highlights areas where institutional support, funding, and policy interventions are needed to enhance teachers' ICT competencies and promote sustainable digital transformation in education.

**The Researcher.** This study serves as a vital diagnostic tool to enhance his own instructional effectiveness and professional growth within the Teacher Education program. The result can bridge the gap between theoretical ICT concepts and practical classroom application.

**Future Researchers.** This study lays the groundwork for further investigations into technology-enhanced teaching and learning in higher education. Future researchers can build upon this study by exploring longitudinal trends in ICT adoption, comparative analyses across institutions, and the impact of digital training programs on teacher effectiveness.

## Operational Definition of Terms

For better understanding, the following terms are defined conceptually and operationally.

**Full-time teachers.** In this study, full-time teachers refer to the respondents who are teaching in the teacher education programs. They are teachers who teach with at least minimum required load or unit as specified in their schools' faculty manual.

**Higher Education Institution (HEI).** In this study, the HEIs refers to the schools that offer teacher education programs namely, the Abra State Institute of Sciences and Technology- Main Campus (ASIST- Main Campus), Abra State Institute of Sciences and Technology- Bangued Campus (ASIST- Bangued Campus), Abra Valley Colleges (AVC), and Divine Word College of Bangued (DWCB).

**ICT Integration.** ICT Integration pertains to the effective incorporation of Information and Communication Technology tools, such as computers, educational software, and digital platforms, into the teaching and learning process to enhance instructional delivery, student engagement, and overall educational outcomes.

**Information and Communication Technology (ICT).** ICT refers to the various digital tools, systems, and applications just like computers, learning management systems, educational software, and internet-based resources that facilitate communication, information processing, and knowledge dissemination in teaching and learning. In the context of this study, ICT encompasses the technologies used by teacher educators to enhance instructional delivery, student engagement, and assessment.

**Information and Communication Technology competence (ICT Competence).** ICT competence, in this study, refers to the level of competence and proficiency that teachers teaching in teacher education programs possess in utilizing ICT tools and applications for instructional purposes. In the study, this ICT competence includes ICT basics, word processing, spreadsheet, presentation, information and communication, and computer ethics and security.

**ICT Basics.** This points to the fundamental knowledge and skills required for operating digital devices, understanding basic computer functions, navigating software applications, and utilizing the internet for teaching and learning purposes.

**Word Processing.** It pertains to the ability of teachers to create, edit, format, and manage text-based documents using software like Microsoft Word or Google Docs, which are essential for preparing instructional materials, reports, and academic documents.

**Spreadsheet.** It shows to the competence in using applications like Microsoft Excel or Google Sheets to organize, analyze, and present numerical data, including functions such as data entry, formula application, chart generation, and statistical analysis for educational purposes.

**Presentation.** It denotes the competence in designing and delivering visually engaging and interactive instructional content using software like Microsoft PowerPoint to enhance classroom discussions and student learning.

**Information and Communication.** It indicates to the ability to effectively use digital platforms, such as emails, learning management systems, and video conferencing tools, for sharing information, collaborating with students and colleagues, and enhancing the teaching and learning process.

**Computer Ethics and Security.** This involves teachers' awareness and application of responsible technology use, including proper online behavior, data privacy, copyright adherence, cybersecurity practices, and measures to protect digital resources from unauthorized access or cyber threats.

**Teacher Education.** In this study, teacher education relates to the academic and professional preparation programs offered by higher education institutions that equip pre-service and in-service teachers with the pedagogical, content, and technological knowledge necessary for effective teaching. It includes courses, training, and methodologies that prepare future educators for classroom instruction and educational leadership.

## RESEARCH METHODOLOGY

This chapter presents the research designs, population and locale of the study, data gathering instruments, data gathering procedure, ethical considerations, and statistical treatment of data.

### Research Design

This study employed quantitative method particularly descriptive research designed to determine the level of Information and Communication Technology (ICT) competence of teachers of higher education institutions (HEIs) offering teacher education programs in the Province of Abra. Additionally, it seeks to examine their perception of ICT integration in teaching teacher education students.

The descriptive method was used in this study as it allowed the researcher to systematically assess and describe the existing ICT competencies of teacher educators and their viewpoints on the incorporation of

technology in instructional delivery. By gathering quantitative data, this study provided a comprehensive analysis of the current state of ICT integration in teacher education programs. According to Kamper (2020) descriptive method uses questions that seek to provide an overview of a particular situation.

### Population and Locale

The study was conducted within the Province of Abra, involving the four Higher Education Institutions (HEIs): the Abra State Institute of Sciences and Technology (ASIST) – Main and Bangued Campuses, Abra Valley Colleges (AVC), and the Divine Word College of Bangued (DWCB). The respondents consisted of 74 full-time faculty members teaching within the teacher education programs of these institutions during the 2024–2025 academic year. The distribution of respondents was as follows: 31 from ASIST-Main, 29 from ASIST-Bangued, 10 from DWCB, and 4 from AVC. Total enumeration was employed to ensure comprehensive data representation.

### Data Gathering Instrument

This study utilized a survey questionnaire as the primary data gathering instrument to assess the level of ICT competence of teacher educators and their perception of ICT integration in teaching. The questionnaire was adopted from Regañon (2024) and Dela Fuente and Biñas (2020), which consists three major sections.

The first section is the respondent's profile which collected demographic information about the respondents, providing context for analyzing their ICT competencies and perceptions. The variables included the type of HEI, years of teaching experience, and generation they belong to. The second section covered the level of ICT competence based from the National ICT Competence which included ICT basics, word processing, spreadsheet, presentation, information and communication, and, computer ethics and security. The third section measured teachers' perception regarding the integration of ICT in teaching.

### Data Gathering Procedures

Before gathering the data, permission and approval was sought from the school heads or school presidents of the HEIs. After the approval, the researcher paid a courtesy to the Program Heads of the teacher education programs of the participating HEIs. Then the researcher personally distributed and retrieved the questionnaires to all the teachers teaching in the teacher education programs of the HEI included in the study. The retrieval rate is 98.65%. The data gathered were tallied, presented, analyzed, and interpreted.

### Statistical Treatment of Data

To effectively analyze the data gathered and address the objectives of this study, appropriate statistical tools and techniques were utilized. The statistical treatment of data ensured that the analysis was systematic, accurate, and meaningful.

Frequency Count and Percentage. The frequency count and percentage was used to analyze the profile of the respondents based on variables such as type of HEI, year of service, and generation they belong to.

Weighted Mean. To assess the level of ICT competence of teachers and their perception of ICT integration, weighted mean was used to determine the level of ICT skills across various indicators and the perception of teacher in ICT integration in teaching.

To interpret teachers' level of ICT competence, the scale range below is used:

| Numerical Rating | Statistical Limit | Interpretation |
|------------------|-------------------|----------------|
| 5                | 4.21 - 5.00       | Proficient (P) |
| 4                | 3.41 - 4.20       | Advance (A)    |

|   |             |                  |
|---|-------------|------------------|
| 3 | 2.61 - 3.40 | Intermediate (I) |
| 2 | 1.81 - 2.60 | Basic (B)        |
| 1 | 1.00 - 1.80 | Fundamental (F)  |

To interpret teachers' perception of ICT integration in teaching, the scale range is used:

| Numerical Rating | Statistical Limit | Descriptive Rating | Descriptive Equivalent |
|------------------|-------------------|--------------------|------------------------|
| 5                | 4.21 - 5.00       | Always             | Very Positive (VP)     |
| 4                | 3.41 – 4.20       | Frequently         | Positive (P)           |
| 3                | 2.61 - 3.40       | Occasionally       | Neutral (Ne)           |
| 2                | 1.81 - 2.60       | Rarely             | Negative (N)           |
| 1                | 1.00 - 1.80       | Never              | Very Negative (VN)     |

T-test. To determine whether there were significant differences in the ICT competence of teachers when grouped by a specific demographic variable, such as type of HEI, the independent samples t-test was employed. This parametric test compared the means of two independent groups to identify statistical differences in their ICT skills.

Analysis of Variance (ANOVA). To examine the differences in ICT competence of teachers when grouped according to multiple categories of a demographic variable such as years of service and generation they belong to, the one-way ANOVA was used. This statistical test evaluates whether there are significant differences between the means of three or more independent groups.

### **Ethical Considerations**

This paper generally obeyed the ethical standards for protecting human subjects of the Philippines Data Privacy Act of 2012 and the Republic Act 8293, section 176. Permission from the authorities and participants was obtained as part of ethical considerations, and data confidentiality was guaranteed. The participants were made aware that their identities will be deleted after the three-year period, during which the data collected for this study would be safely kept on the researchers' own computers. The researcher considered that the participants were not subjected to anything that may cause emotional and psychological harm. The researcher explained the study's purpose to increase their understanding and remove possible deception. The researcher likewise understood that in conducting this study, the participants participated out of their free will; thus, they were not forced to participate in any research undertaking.

### **Presentation, Analysis, And Interpretation Of Data**

This chapter presents and interprets the findings of the study on the profile of teachers, teachers' Information and Communication Technology (ICT) competence along ICT basics, Word processing, Spreadsheet, Presentation and Ethics and Security; teachers' perception of ICT integration in teaching.

**Problem 1. What is the profile of teachers teaching in the Teacher Education Programs in the Province of Abra in terms of:**

- a. Type of HEI belong to
- b. Years of teaching

### c. Generation belongs to?

Table 1 presents the profile of the teachers teaching in the teacher education programs in both public and private schools in the Province of Abra.

Table 1 Profile of Teachers Teaching in the Teacher Education Programs

| Profile                                   | Frequency | Percentage  |
|-------------------------------------------|-----------|-------------|
| <b>Type of HEI</b>                        |           |             |
| a. Private                                | 14        | 18.92       |
| b. Public                                 | 60        | 81.08       |
| <b>Total</b>                              | <b>74</b> | <b>100%</b> |
| <b>Years of Teaching</b>                  |           |             |
| a. 0-3 years                              | 16        | 21.62       |
| b. 4-6                                    | 17        | 22.97       |
| c. 7-10                                   | 11        | 14.86       |
| d. 10 years and above                     | 30        | 40.54       |
| <b>Total</b>                              | <b>74</b> | <b>100%</b> |
| <b>Generation belongs to</b>              |           |             |
| a. Baby Boomers (1946-1964)               | 3         | 4.05        |
| b. Generation X (1965-1980)               | 25        | 33.78       |
| c. Millenials or Generation Y (1981-1994) | 21        | 28.38       |
| d. Generation Z (1995-2009)               | 25        | 33.78       |
| <b>Total</b>                              | <b>74</b> | <b>100%</b> |

On Type of Higher Education Institution (HEI). The majority of the respondents are affiliated with Public HEIs, accounting for 60 individuals or 81.08% of the total population. Meanwhile, 14 respondents (18.92%) are from Private HEIs. This indicates that the study is predominantly represented by educators from the public sector. The result can be attributed to the population of students, in the Province of Abra, public schools have bigger number of students, compared to the private counterparts. Thus having bigger number of teachers in public school is needed. The result may also be attributed to salary for most teachers prefer to apply in the public schools because of higher pay.

On Years of Teaching Experience. In terms of professional experience, the largest group consists of seasoned educators with 10 years and above of teaching experience, representing 40.54% (30) of the respondents. Sixteen (16) or 21.62% of the respondents belong to 0-3 years, seventeen (17) or 22.97% are in their 4-6 years of teaching experience, while 11 of 14.86% have 7-10 years of experience which comprised the smallest group. The data suggest that nearly half of the teachers are veteran teachers with sustained classroom experience. This result is attributed to the idea that teaching is a lifelong commitment. Veteran teachers frequently stay because in many systems, once teachers reach a certain number of years, they gain job security

which is that is difficult to find in the different sectors, for example in DWCB, teachers who reach ten years are entitled to receive Divine Word Educators Association (DWEA) retirement fund.

On Generational Distribution. Regarding the age cohorts of the respondents, Generations X and Z born from 1965-1980 and 1995-2009 respectively, represents the largest segment with 25 respondents each accounting for 33.78%. This is followed by Generation Y or Millennials (1981-1994) with 21 respondents (28.38%). The Baby Boomers (1946-1964) constitute the smallest portion of the teachers, with only 3 individuals (6.98%). The data shows that the teaching population is composed mainly of Generation X and younger generations, suggesting a blend of experience and youthful energy in the teacher education programs in Abra.

**Problem 2. What is the level of ICT competence of teachers in the Teacher Education programs in terms of:**

- a. ICT Basics
- b. Word Processing
- c. Spreadsheet
- d. Presentation
- e. Information and Communication
- f. and Computer ethics and security?

Table 2 shows the level of teachers' ICT competence specifically in terms of ICT Basics.

The data presents that teacher` skill in ICT basics in using fundamental digital tools and technologies described as proficient as evidenced by the mean of 4.51. This level of competency means that teachers possess a high level of ability and confidence in using fundamental digital tools and technologies. This includes using printers, operating computer, managing files, and even trouble shooting a computer. This finding reveals the wide awareness of teachers on the advantages of utilizing the different ICT tools in effectively delivering learning to their students. With teachers` competency in this area, they are able to integrate ICT into their teaching practices, making learning more interactive, accessible, and engaging for students.

Table 2 Level of ICT Competence in terms of ICT Basics

| ICT Basics                                                               | $\bar{X}$ | DE |
|--------------------------------------------------------------------------|-----------|----|
| 1. Explain the terms Information Technology and Communication Technology | 4.20      | A  |
| 2. Identify the different hardware and software components of a computer | 3.91      | A  |
| 3. Differentiate the different types of software                         | 3.76      | A  |
| 4. Discuss networking/ Communication Technology                          | 3.76      | A  |
| 5. Operate a computer                                                    | 4.51      | P  |
| 6. Arrange and customize the desktop                                     | 4.32      | P  |
| 7. Manage application                                                    | 4.22      | P  |
| 8. Manage files                                                          | 4.43      | P  |

|                               |             |          |
|-------------------------------|-------------|----------|
| 9. Manage printer             | 4.45        | P        |
| 10. Troubleshoot the computer | 3.61        | A        |
| <b>Mean</b>                   | <b>4.51</b> | <b>P</b> |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |
| 1.81-2.60          | Basic (B)              |
| 1.00-1.80          | Fundamental (F)        |

The proficient competence in ICT basics among teachers, as reflected in the result, can be primarily attributed to the institutionalization of digital transformation within the Commission on Higher Education, particularly over the last few years. The transition from the COVID-19 pandemic's distance learning modalities to the current curriculum has necessitated a shift from conventional to mandatory digital fluency. Programs such as the Smart Campus Project, CHED Responding through AI for Societal Empowerment (CHED RAISE) and Konektadong CHED have not only increased the availability of hardware like laptops and tablets, but have also mandated continuous upskilling through the Philippine Professional Standards for Teachers (PPST). Particularly, all schools offering teacher education programs, including DWCB, were mandated to implement curriculum changes particularly adding the courses Living in the IT Era, Educational Technology 1 and Education Technology 2.

As cited in Implementation of ICT Skills for the Students in their Employment of Skill Based Jobs (n.d.), Majumdar (2006) emphasized that ICT holds a very high potential to transform the educational landscape into a more dynamic and effective system. Teachers' advanced ICT skills allow them not only to adapt to the technological demands of modern education but also to lead innovations in their classrooms. Moreover, UNESCO (2006) noted that literacy is continuously evolving beyond traditional reading and writing skills to include practices mediated by technology (as cited in Gutierrez & Vidal, 2012; Khashkhuu, 2017). In this context, the teachers' advanced competence shows that they are keeping pace with the evolving definition of literacy, positioning themselves as role models for their students (UNESCO, 2002). The ability of teachers to skillfully use ICT sets a standard for future teachers, aligning with Jadhav's (2011) assertion that the quality of teacher education graduates depends significantly on the quality of teachers educating them. Furthermore, the findings affirm the studies of Roblin et al. (2018) and Hero (2020) which signify that a broader technological readiness and willingness among teachers to engage with hardware tools that complement digital instruction directly impacts their competence in utilizing ICT in the classroom.

In terms of ICT Basics, teachers are proficient in operating a computer as shown in the mean of 4.51. This indicates that the teachers possess a strong command of fundamental hardware and software functions, such as managing files, navigating operating systems, and utilizing peripheral devices. The high level of this proficiency suggests that basic computer literacy has transitioned from a specialized technical skill to a core competency for teacher-educators. This may be attributed to the long-term integration of DepEd and CHED digitalization mandates, which have necessitated daily computer use for instructional tasks, lesson preparation, and solve administrative tasks.

The result is aligned with the TPCK framework, which posits that foundational technological knowledge is the beginning to successful digital integration in the classroom. In this framework, it gives emphasis on the vast

array of possibilities when a teacher has basic knowledge of the computer software. Additionally, it also underscores that for teachers to fully integrate technology in the teaching and learning process, they must be equipped with basic skills.

The competency “managing printers” obtained a mean of 4.45 which suggests that teachers have a strong proficiency and confidence in handling peripheral technologies like printers that support day-to-day instructional tasks in terms of preparing modules, printed illustrations, printed charts, and other instructional materials. The high rating can be attributed to the radical shift toward modular distance learning during the COVID-19 pandemic. As schools transitioned from conventional classrooms to distant asynchronous learning, teachers were suddenly tasked with the massive production of Self-Learning Modules (SLMs) to ensure learning continuity for students without internet access. The daily demand for printing document and materials transformed the printer from a peripheral office tool into a primary instructional lifeline, forcing a rapid, hands-on mastery of the hardware. Furthermore, many teachers were required to manage these devices independently at home or in school leading to a significant increase in technical self-sufficiency.

This level of competence, while often viewed as peripheral compared to more complex ICT tasks, plays a critical supporting role in the teaching and learning process. As emphasized by Khatua (2012), Siddiquah and Salim (2017), teachers should have fundamental skills in ICT to effectively integrate it in the teaching and learning process. Such competence results to teachers` ability to craft printed materials such as lesson plans, activity sheets, student outputs, assessment materials, and other instructional resources that remain integral to many educational settings, particularly in contexts where digital devices are limited or where blended learning models are in place (Ounis, 2016; Rokenes & Krumsvik, 2016). The ability to produce and manage printed instructional materials remains a key element in differentiated and inclusive education, particularly for learners who benefit from tangible, written resources (Seufert et al., 2020).

Moreover, the results also reveal that teachers are proficient in managing files with a mean of 4.43, indicating a strong foundational competence in essential ICT skills. These tasks, while categorized as basic, form the cornerstones of digital literacy in the educational environment. Having this competency implies that the teachers possess the necessary technical skills and confidence to perform routines that require digital expertise like instructional preparation, delivery, and management. Managing files, involves organizing digital documents, using appropriate folder structures, applying file-naming conventions, and performing tasks such as saving, retrieving, backing up, and transferring data. These skills are vital for educators working in increasingly digitalized teaching environments. As Bingimlas (2018) mentioned, content pedagogy should go along with technological knowledge.

The findings support the findings of Schere et al. (2019) who mentioned that teachers become more productive if they know how to manage and sort files. Additionally, Saubern et al. (2019) also underscored that teacher who is adept at operating computers and managing files are better equipped to plan lessons, prepare multimedia materials, administer digital assessments, and maintain records of student performance. Furthermore, teachers' competence in these skills also models digital best practices for students. If pre-service teachers observe that their teachers are modeling good practices in terms of managing files, this better prepares them to be adept as future teachers in the 21<sup>st</sup> century. Teachers who can efficiently use and manage digital tools are more likely to deliver engaging, organized, and student-centered learning experiences (Hero, 2020).

However, it is notable that the area of troubleshooting a computer received the lowest mean score (3.61), though still classified within the advanced competency level. This suggests that while teachers generally possess a high degree of competence across ICT domains, this particular area may pose more challenges relative to others. Computer troubleshooting involves diagnosing and addressing basic technical issues related to hardware, software conflicts, connectivity, or system performance. The comparatively lower result points to a gap in higher-order ICT skills, particularly those involving analytical thinking and technical decision-making.

The results show that teachers may still rely heavily on external IT support rather than resolving issues independently like when technical glitches occur, such as hardware malfunctions, connectivity issues, or software errors. This dependency can lead to "instructional downtime," where the flow of a lesson is

interrupted by technical hurdles that the instructor cannot immediately fix. While HEIs continue to adopt more complex Learning Management Systems (LMS), the inability to troubleshoot basic hardware and software issues could become a bottleneck. This implies that there is a need to strengthen this specific competency to increase teacher confidence but also reduce the administrative burden on institutional IT departments every time this occurs.

Koh and Divaharan (2011) and Regañon (2024) emphasized that to meet the expected outcomes, teachers must be continuously supported in building their ICT competence. While teachers have high level of competence in basic ICT skills, advancing towards full integration still needs to be undertaken (Al-Bataineh et al., 2008). Furthermore, to maximize teachers' skills and competency in technology, collaboration among experts and pedagogical support should be provided to them (Ertmer & Ottenbreit-Leftwich, 2010).

The level of teachers ICT competence in terms of Word Processing is shown in the table that follows.

Table 3 Level of ICT Competence in terms of Word Processing

| Word Processing                                 | $\bar{X}$   | DE       |
|-------------------------------------------------|-------------|----------|
| 1. Manage documents                             | 4.47        | P        |
| 2. Format text                                  | 4.45        | P        |
| 3. Format paragraph                             | 4.47        | P        |
| 4. Format document                              | 4.41        | P        |
| 5. Move and copy text, insert text, delete text | 4.57        | P        |
| 6. Insert tables                                | 4.57        | P        |
| 7. Insert pictures and images                   | 4.51        | P        |
| 8. Preview a document                           | 4.50        | P        |
| 9. Print a document                             | 4.64        | P        |
| <b>Mean</b>                                     | <b>4.51</b> | <b>P</b> |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |
| 1.81-2.60          | Basic (B)              |
| 1.00-1.80          | Fundamental (F)        |

The results show that teachers are proficient in using word processing software with the mean of 4.51. This proficiency encompasses a range of essential skills including composing, formatting, editing, saving, and organizing text-based documents. It also involves more advanced functions such as inserting tables, and images which are crucial features in the preparation of professional and pedagogically sound learning

experiences and materials. Additionally, this level of proficiency contributes to instructional efficiency, reducing the time and effort of teachers in preparing print materials. For example, instead of teachers manually drawing a material, they can utilize word processing software to print images. In this case, they do not only save time and effort but also produce quality and clear materials for the delivery of learning. It further enhances student access to organized and well-presented learning materials, which supports comprehension and retention, especially in content-heavy courses common in teacher education. This means that teachers are well-equipped to prepare instructional materials, such as syllabi, assessment activities, tests, and handouts, efficiently and professionally using word processing software. Furthermore, the mean is attributed to the fact that nowadays, most if not all have their gadgets to use. Teachers who have available gadget tend to have higher proficiency as they have a gadget to explore and practice.

When teachers are proficient in word processing, it means they can efficiently produce high-quality instructional resources, such as syllabi, lesson plans, activity sheets, learning modules, assessment tools, and feedback forms (Ogwu & Ogwu, 2016; Ghavfekar & Rosdy, 2015). The ability of teachers to utilize word processing software reinforces the importance of digital documentation and clear communication, which are indispensable in transforming a classroom into a more interactive and productive space for learners (Gusen & Gusen, n.d.).

In the area of word processing, teachers showed proficient skill in printing a document with a mean of 4.64. This indicates a high level of proficiency and familiarity with the technical process of producing hard copies of digital content. The prior result in ICT basics particularly on printer management directly relates with the teachers' high performance in printing a document in the area of word processing, as these two competencies are functionally inseparable. This is evident in producing localized examination papers, activity sheets, and SLMs. Proficiency in printing supports efficiency in material preparation, enabling teachers to produce handouts, worksheets, assessment tools, and other instructional documents promptly. This ensures that students, especially in low-resource or blended learning environments, receive timely access to learning aids even without full digital infrastructure. Umar and Yusoff (2014) further mentioned that teachers' ability to print is a skill that is basic and foundation to become responsive to needs of the learners of the millennium.

The results further imply that teachers have mastered not only the hardware operations related to managing printer but also software functions involved in preparing documents for printing learning materials that can improve the quality of learning that learners need. The ability of teachers in printing a document affirms the findings of Hero (2020) attests that most teachers are consistently confident and capable in executing this task with minimal assistance. Similarly, as emphasized by Maurer et al. (2011) and Adeyinka and Mutala (2008) (as cited in Okigbo & Enemuo, 2021), skills such as using printer to print learning materials and other related materials are core components of technology literacy and are further considered as a critical requirement for modern educators operating in both digital and print-based instructional environments.

The high performance of teachers in printing and document manipulation, such as moving, copying, and inserting tables, reflects the "applying" phase of ICT integration. Majumdar (2006) describes this phase as the practical operationalization of digital resources in classroom settings. Additionally, the proficient skill of teachers in inserting tables corroborates the views of Maurer et al. (2011) and Okigbo and Enemuo (2021) that true technology literacy involves using tools to improve quality of learning. Despite overall proficiency, the lower mean score of 4.41 for formatting documents implies a need for improvement.

The skill moving and copying text, inserting text, deleting text, and inserting tables both gained a mean of 4.57 which are also interpreted as proficient. This clearly indicates that teachers possess a high level of functional expertise in manipulating and organizing digital content using word processing software like the basic editing and formatting functions of word processing software particularly copying, moving, inserting, and editing a text. Being proficient in this competency implies that teachers are competent in editing documents. With this competency, teachers are able to create structured, reader-friendly instructional materials. This high mean may be influenced by the trainings and workshops provided to teachers. For example, in DWCB teachers undergo in-service trainings are provided to teachers and part of it are enhancement program in the use of word processing software. Similarly, other schools like ASIST, also do the same initiatives.

Moreover, teachers' proficiency in inserting tables demonstrates their capacity to organize data visually, which is crucial for presenting lesson content, assessment rubrics, schedules, and other structured information. This skill enables teachers to prepare clear, organized, and professional materials that can support various learning modalities such as print-based, digital, or blended. Tables using word processing software is very important especially in instructional pedagogy because through it, teachers able to present a clearer content resulting for visual learners an easier and more enjoyable learning experiences.

In terms of formatting a document, it obtained a mean score of 4.41 which is the lowest among the competencies in word processing, though interpreted still as proficient. This implies that some teachers encounter challenges in formatting techniques such as setting margins, aligning sections, applying consistent styles, and using headers and footers effectively. This result signals a need for targeted professional development, as emphasized by Majumdar (2006) that is to move educators toward using technology more effectively to design materials that align with curriculum goals. Strengthening the teachers' skill in formatting is vital to avoid cluttered materials that reduce instructional effectiveness for diverse learners. This gap may be addressed through workshops and trainings on document design to ensure that teachers can produce the accessible and adaptable resources necessary for the evolving demands of 21st-century education.

Table 4 presents the level of teachers ICT competence in terms of Spreadsheet.

Table 4 Level of ICT Competence in terms of Spreadsheet

| Spreadsheet                                                  | $\bar{X}$   | DE       |
|--------------------------------------------------------------|-------------|----------|
| 1. Manage workbooks                                          | 4.07        | A        |
| 2. Select cells, enter data in cell, insert and delete cells | 4.30        | P        |
| 3. Handle worksheets                                         | 4.18        | A        |
| 4. Format data                                               | 4.14        | A        |
| 5. Format cells                                              | 4.19        | A        |
| 6. Format worksheet                                          | 4.59        | P        |
| 7. Create formulas and functions                             | 4.03        | A        |
| 8. Create and format charts/graphs                           | 4.16        | A        |
| 9. Preview a worksheet and print a document                  | 4.19        | A        |
| <b>Mean</b>                                                  | <b>4.20</b> | <b>A</b> |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |
| 1.81-2.60          | Basic (B)              |
| 1.00-1.80          | Fundamental (F)        |

The results show that teachers are advanced in using spreadsheets as reflected in the mean of 4.20. This result reveals that teachers possess a strong level of competence in using spreadsheet applications such as Microsoft Excel or Google Sheets. This suggests that teachers are comfortable with intermediate functions, including entering and organizing data, using basic formulas, generating simple charts, and applying formatting for clarity and data presentation. Ghavifekr and Rosdy (2015) highlighted that competency of teachers in specific software allows limitless opportunities to improve quality and integrity of learning.

Having an advanced competence in using spreadsheet reflects a significant degree of digital fluency in managing data, an essential component of 21st-century teaching. For one, teachers with advanced spreadsheet skills are better equipped to perform data-driven tasks such as generating student performance reports, analyzing learning outcomes, and adapting instruction based on data trends. These practices are vital in outcomes-based education (OBE) frameworks, where evidences of student achievement must be systematically tracked and addressed.

Of the indicators, formatting worksheet with a mean score of 4.59, described as proficient, indicates that teachers demonstrate an excellent level of competence in organizing, designing, and presenting data effectively within spreadsheet applications such as Microsoft Excel or Google Sheets. This level of proficiency reflects teachers' ability to apply complex formatting techniques such as adjusting cell alignment, applying conditional formatting, merging cells, and designing tables to enhance the clarity and visual appeal of spreadsheets. In DWCB and ASIST, students' grade are recorded and computed through Microsoft Excel, if teachers have a proficient competence in selecting cells, entering data in a cell, inserting and deleting cells, it is ensured that accurate marks are provided to the students. Formatting a worksheet effectively is not merely a technical task but it is a pedagogical strategy that improves data comprehension, supports analytical thinking, and enables efficient tracking of student performance and classroom metrics. When teachers know how to format cells, they eventually turn cells to a space where data are automatically interpreted. For example, one of the most functional features of spreadsheet is conditional formatting where teachers can actually create a formula to determine whether or not a student passed or failed an activity upon entering their score. As excel does not only compute accumulated data but also interpret data according to how teachers format cells.

The teachers' competency on selecting cells, entering data in a cell, inserting and deleting cells gained a mean 4.30, is also interpreted as proficient. This result suggests that teachers have a strong command of foundational spreadsheet operations. This is evident for teachers who use spreadsheets to compute students' grade, create interactive activities through conditional formatting, and sort and analyze data. This high level of competence signifies that teachers are adept at navigating and manipulating spreadsheet environments with efficiency and accuracy, allowing them to manage digital data. This competency allows teachers create tables and charts necessary in delivering quality learning, record summative and formative assessments accurately, and easily track students attendance.

Furthermore, the strong command of foundational operations, such as selecting and entering data, indicates that teachers are challenged to meet the demands of modern learning environments. As noted by Ogwu and Ogwu (2016), these fundamental skills in selecting and organizing data are critical for creating instructional resources that are responsive to the needs of the 21st-century learner. This proficiency allows instructors to model data literacy for their students, cultivating an appreciation for digital proficiency as a core teaching skill. By navigating spreadsheet environments with accuracy, educators ensure that digital tools are utilized effectively for future pedagogical applications, mirroring the trend of embedding digital literacy into every layer of teacher education.

Meanwhile, creating formulas and functions, and managing workbooks with means of 4.03 and 4.07 respectively are the two competencies gaining the lowest mean scores, though still interpreted as advanced. While these scores still reflect a relatively strong competence, their lower ranking compared to other indicators suggests that teachers may have limited competency in more complex spreadsheet tasks that require analytical and integrative skills. This implication is attributed to the lack of trainings and workshop provided to teachers in terms of the more complex function of spreadsheets. Spreadsheets are most essential in creating formula and functions. However, if teachers lack such proficiency, this limits their efficiency in doing tasks which necessitates ICT integration, and also limits their capability in maximizing ICT tools. Managing workbooks on

the other hand is a skill that teachers may use to ensure that students` data record is organized and properly filed. In a classroom, teachers` ability to manage workbook is important as it allows collaboration. For example, a teacher who knows how to create workbook may create a template for others to use as well. Additionally, if teachers lack this skill, chances of data lost is possible and can result to possible problems. The ability to create formulas and manage workbooks is essential not only for instructional efficiency and data management but also for promoting a culture of evidence-based decision-making and digital literacy. If teachers lack confidence or competence in these areas, it may result to missed opportunities to fully harness technology for teaching, learning, and assessment.

Table 5 presents the level of teachers ICT competence in terms of Presentations.

Table 5 Level of ICT Competence in terms of Presentation

| <b>Presentation</b>                                    | <b><math>\bar{X}</math></b> | <b>DE</b> |
|--------------------------------------------------------|-----------------------------|-----------|
| 1. Discuss basic presentation skills                   | 4.24                        | P         |
| 2. Apply appropriate visuals and design considerations | 4.27                        | P         |
| 3. Manage presentations using a presentation tool      | 4.38                        | P         |
| 4. Create slides                                       | 4.50                        | P         |
| 5. Use different slide views                           | 4.50                        | P         |
| 6. Apply slide layouts and templates                   | 4.43                        | P         |
| 7. Format text                                         | 4.41                        | P         |
| 8. Insert pictures and images                          | 4.46                        | P         |
| 9. Insert drawn objects                                | 4.32                        | P         |
| 10. Create charts/graphs                               | 4.24                        | P         |
| 11. Create a slide show                                | 4.47                        | P         |
| 12. Apply slide show effects                           | 4.38                        | P         |
| 13. Prepare outputs                                    | 4.44                        | P         |
| 14. Print slides                                       | 4.19                        | A         |
| <b>Mean</b>                                            | <b>4.37</b>                 | <b>P</b>  |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |
| 1.81-2.60          | Basic (B)              |

The results show that teachers are proficient in using presentations as reflected in the mean of 4.37. This strongly posits that teachers have a high confidence in using and integrating presentations in the teaching and learning process such as creating and designing interactive presentations necessary to meet learners' individual needs. In a typical classroom setting, this is evident when a teacher utilizes hyperlinked slides to allow students to choose their own learning paths during a self-paced activity. Furthermore, teachers demonstrate this mastery by embedding multimedia elements and real-time quizzes into their lectures to keep diverse learners engaged and responsive. This proficiency may be a result of the availability of learning resources online including AI tools that can generate slides through good and proper prompts. This skill is further strengthened in schools like DWCB because teachers are highly encouraged to integrate presentations in their discussions as reflected in the observation checklist used by program heads during class observations.

This level of proficiency affirms that teachers are well-positioned to model best practices in technology integration, which is essential in shaping the digital competencies of pre-service teachers. In today's environment, teachers need to constantly adapt to an ever-shifting technological landscape and evolving pedagogical standards. Since the Philippine Professional Standards for Teachers (PPST) emphasize the integration of ICT to enhance learning, the proficient use of interactive presentations becomes not only a matter of instructional enhancement but also a professional importance. Teachers' ability to create, use, and integrate interactive presentations in their teaching and learning process results to a more meaningful learning where students learn in a fun and exciting manner. These competencies in the area of presentation includes applying appropriate visual and design considerations, manage presentations, create slides, applying slideshow effects, and even printing slides. Teachers of today need to embrace technological changes as the students nowadays are fond of classroom visual, engaging and interactive activities.

The competencies on creating slides and using different slide views both gained a mean score of 4.50, interpreted as proficient. The high proficiency in creating slides signifies that teachers are adept at the foundational task of digitizing instructional materials into a visual format. On the other hand, the equal proficiency in using different slide views such as Slide Sorter, Outline View, or Presenter View demonstrates a sophisticated ability to navigate the software's limitless features. When teachers leverage these capabilities to craft visually stimulating and well-organized presentations, students naturally become more interested and attentive during discussions. This mastery allows for a more dynamic delivery of content, transforming traditional lectures into captivating experiences that resonate with modern learners. In a classroom of diverse learners, having these competencies ensure inclusive classroom. As presented by the TPACK framework, teachers technological knowledge along with pedagogical knowledge create learning environment where learner learn interestingly.

The high level of proficiency in creating slides and utilizing diverse slide views (4.50) among teacher directly aligns with the mandates of the Philippine Professional Standards for Teachers (PPST), which identify ICT integration as a professional imperative for modern educators. Such technical fluency is supported by Gusen and Gusen (n.d.), who affirm that basic competence in presentation software is a fundamental requirement for achieving excellence in the teaching profession.

However, the competency of printing slides obtained the lowest mean score of 4.19. Though interpreted as proficient, it still indicates that while teachers possess a high level of mastery in creating and navigating digital presentations, they demonstrate a comparatively lower ability to produce physical outputs of their slide decks. This lower mean may stem from the modern shift toward paperless classrooms, where digital sharing is often prioritized over traditional hard copies. Despite this trend, the ability to print slides remains essential for providing tangible handouts to students with limited internet access or for creating physical archival records of instructional materials. To address this gap, teachers need targeted technical orientation on print settings, they should be further provided with assistance to familiarized themselves about this feature of presentations. Furthermore, for these skills to be fully utilized, school administrations must ensure that teachers are supported with consistent access to functioning hardware and printing supplies. Such adjustments will ensure that educators are not just digitally capable, but also equipped to provide inclusive learning.

This result further implies that while teachers have overwhelming competence in managing and printing documents in word processing (as reflected in the previous domain), some may still have to be reminded that slides in presentations as well can be printed and can be used by teachers to a more effective delivery of learning. Teachers' ability to print the slides of their presentation may help their learners have notes especially for intrapersonal learners who find wellness in working alone. From a pedagogical standpoint, the ability of teachers to print slides is still important as physical outputs remains a crucial component of inclusive instruction (Ogwu & Ogwu, 2016)

Table 6 presents the teachers' competence in terms of Information communication area.

As shown in the table, teachers are proficient in information communication as reflected in the mean of 4.24. The obtained result indicates that teachers possess a relatively strong ability to engage in discussions related to the World Wide Web (WWW), accessing and utilizing the WWW, send, receive, and organize emails, and bookmark imperative sites in the WWW. In the contemporary educational landscape, where digital communication forms the backbone of teaching, learning, collaboration, and professional networking, this level of competence reflects positively on the readiness of teachers to engage with the demands of a digitally connected academic environment. This is important in an era where blended, hybrid, and fully online learning modalities have become prevalent. The ability to effectively communicate using digital tools is not merely technical but rather it is pedagogical and professional. Furthermore, the result also aligns with the National ICT Standards (NICTS), which highlight "Information and Communication" as a core skill domain, emphasizing the integration of communication technologies in teaching and professional engagement.

Table 6 Level of ICT Competence in terms of Information Communication

| Information Communication              | $\bar{X}$   | DE       |
|----------------------------------------|-------------|----------|
| 1. Discuss Internet and World Wide Web | 4.05        | A        |
| 2. Access the Web                      | 4.30        | P        |
| 3. Use Bookmarks                       | 4.03        | A        |
| 4. Search the Web                      | 4.41        | P        |
| 5. Download web pages                  | 4.30        | P        |
| 6. Send and receive email              | 4.47        | P        |
| 7. Create an Address Book              | 4.00        | A        |
| 8. Organize messages                   | 4.23        | A        |
| 9. Print messages                      | 4.38        | P        |
| <b>Mean</b>                            | <b>4.24</b> | <b>P</b> |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |

1.81-2.60

Basic (B)

1.00-1.80

Fundamental (F)

While the mean of 4.24 indicates proficient level, it still implies that teachers continue to develop their competence, particularly in ensuring depth of use, critical awareness, and pedagogical alignment. In the digital landscape of education in the Philippines, being proficient in information communication area of ICT is important because it provides the digital communication edge of teachers and the students to cope with the demands of the 21st century. Furthermore, this finding denotes that teacher education in the Province of Abra is ensuring that it meets the requirements of digital citizenship in the aspect of education. As Castro (2018) highlighted, HEIs should strictly realign their curriculum to meet the PPST domains.

The competency of sending and receiving emails received the highest mean score of 4.47, interpreted as proficient. This reflects that teachers are considerate in the fact that email is a good means of integration of technology on the delivery of teaching and learning. In the academic setting, especially in teacher education, proficiency in email usage plays a central role in facilitating timely communication with students, colleagues, administrators, and external stakeholders. Considering the trend in the education, this has given more emphasis particularly during the pandemic, on facilitated the communication of teachers, students and even parents and other stakeholders. The use of email remains one of the most widely used formal communication tools in higher education institutions. For teachers, having the ability to send and receive email implies that they are maximizing communication tools as aids in ensuring that teaching and learning observes an open line of communication. Furthermore, it implies that teachers utilize email in the dissemination of learning materials, feedback on student outputs, coordination of academic activities, and collaboration with peers, parents and other stakeholders. Such competency is attributed to schools' initiative to provide teachers an avenue where they are given a hands-on learning. For example, in DWCB, all teachers may not be sent to trainings but strategies such as reechoing during INSET is held to assure that everyone is updated and upskilled despite non-attendance to trainings due to limitations.

Similarly, the competency searching the web also gained a high mean score of 4.41 interpreted as proficient, which signifies that teachers are highly capable of sourcing digital resources for their instructional needs. For instance, teachers may search the web for applications that can provide presentations, images, games, worksheets, videos, and even music necessary to aid classroom instruction. This further suggests that teachers are also skilled researchers who can leverage search engines to find updated content, scholarly articles, and multimedia tools to enrich their daily lessons. This strong performance in web searching carries significant weight for the modern classroom, as it serves as the backbone for evidence-based teaching and continuous professional development. By demonstrating a proficient ability to filter and retrieve online data, teachers act as effective gatekeepers of information for their students, ensuring that the curriculum remains relevant in a rapidly changing digital age. Meanwhile, their ability to search instantly is likewise important especially in the lens of energy crisis. With the trend of educational landscape in the Philippines, teachers have to embrace and maximize the use of technology, as a responsible user.

Meanwhile, the competencies using bookmarks and creating an address book obtained the lowest mean scores of 4.03 of 4.00 respectively, both interpreted as Advanced. While this interpretation still reflects a relatively high level of ICT competence, though rated as the lowest items suggest as area of which teachers are not too familiar, and do not use as frequently as the other features. The ability to use bookmarks is more than a mere technical function as it is a time-saving strategy that enables educators to quickly retrieve relevant information, manage instructional resources, and curate content for teaching. For teachers, bookmarking can support instructional planning and the modeling of information literacy skills for pre-service teachers. The result reflects underutilization or limited exposure to browser-based tools that can streamline digital workflow and improve instructional delivery. It implies that teachers need to strengthen the use of digital tools. The creation and use of an address book, a function available in email platforms and contact management systems that serves as a tool for efficient communication and collaboration. This competence is highly needed in teacher education where collaboration and coordination with multiple stakeholders are crucial for this leads to efficiency when these are maximized. When these two competencies are developed in the teachers better, they

can equip future teachers with a more holistic and functionally integrated set of ICT skills, preparing them for real-world teaching environments where digital efficiency and organization are as crucial as content delivery.

Table 7 presents the competence of teachers in terms of ethics and security.

Table 7 Level of ICT Competence in terms of Ethics and Security

| Ethics and Security                                                                                               | $\bar{X}$   | DE       |
|-------------------------------------------------------------------------------------------------------------------|-------------|----------|
| 1. Understand personal property and user rights                                                                   | 4.32        | P        |
| 2. Understand the concept of software piracy and violation of copyright laws                                      | 4.27        | P        |
| 3. Recognize examples of copyright violations, computer fraud and possible penalties                              | 4.24        | P        |
| 4. Apply common courtesies and acceptable use policies while telecomputing                                        | 4.16        | A        |
| 5. Explain the concept of Security                                                                                | 4.09        | A        |
| 6. Recognize and respond to ethical situations and cyber security issues involving computing devices of all forms | 4.14        | A        |
| 7. Apply fundamental principles of computer security                                                              | 4.01        | A        |
| <b>Submean</b>                                                                                                    | <b>4.18</b> | <b>A</b> |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Proficient (P)         |
| 3.41-4.20          | Advanced (A)           |
| 2.61-3.40          | Intermediate (I)       |
| 1.81-2.60          | Basic (B)              |
| 1.00-1.80          | Fundamental (F)        |

The results show that teachers have advanced competency in ethics and security as reflected in the mean of 4.18. The result suggests that teachers demonstrate a commendable level of competence in the proper conduct, safety, and ethical use of ICT tools. This indicates that teachers are generally knowledgeable about responsible digital practices, such as understanding personal property and user rights, understanding the concept of software piracy and violation of copyright laws, recognize example of copyrights violations, plagiarism, computer fraud and possible penalties, apply common courtesies and acceptable use policies while telecomputing, explain the concept of security, recognize and respond to ethical situations and cyber security issues, and apply fundamental principles of computer security. All these skills are important in the shift from the conventional to digital classrooms.

With the presence of Data Privacy Office (DPO) in schools, teachers are now provided with insights on how crucial it is to safeguard students` data. Through the DPO, teachers are also provided specific strategies on how to manage the data they hold. Teachers` proficiency in ethics and security also implies that they are aware on how to keep and secure the data they hold. In addition, it signifies that they are skilled in identifying possible software piracy and copyright violations. All of these lead to classroom efficiency where teachers ensure that the resources, they distribute to students are legally sourced and properly attributed. In addition, their high-

level proficiency in security and safety suggests that they are aware of cybersecurity issues, such as recognizing phishing, hacking, and spamming. Although teachers have already reached the highest level of proficiency in this area, they may still continue enhancing this through training and workshops. They may also further their skills by actively involving them in drafting institutional digital ethics frameworks, allowing them to mentor peers who may still struggle with the ethical problems. By adhering to fundamental principles of computer security and ethical response, teachers align with international standards that prioritize student privacy and intellectual property. This aligns with the claims of Teo (2011), Siddiquah and Salim (2017), and Saubern et al. (2019) that when teachers feel ethically competent, they are more likely to integrate ICT tools with confidence, as the fear of doing something wrong or compromising security is significantly diminished.

The highest rated item, understanding personal property and user rights received the highest mean score of 4.32, interpreted as proficient. It signifies that teachers demonstrate a strong and well-developed understanding of intellectual property rights, copyright laws, user agreements, and the ethical considerations surrounding ownership and use of digital content. It reflects their ability to recognize and respect the rights of content creators, adhere to legal guidelines when using or reproducing materials, and promote responsible digital behavior among students. In the digital age where content is easily shared, copied, and repurposed, understanding and observing personal property and user rights is essential to maintain academic integrity and respect the labor and creativity of others. This competency goes beyond avoiding plagiarism as it encompasses an understanding of fair use, creative commons licensing, digital ownership, and the consequences of intellectual property violations. The result also suggests that teachers are not only aware but are also consistently practicing appropriate behaviors concerning digital ownership.

This proficiency further suggests that teachers are moving beyond basic usage toward a better awareness of intellectual property. This implies that teachers are aware of the data privacy laws, such as the Philippines' Data Privacy Act of 2012 (RA 10173), which governs how personal information is managed in digital spaces. Furthermore, this result corroborates studies by the DICT on digital literacy, which have consistently highlighted that teachers increase their exposure to formal ICT training, their ability to safeguard personal property and assert digital rights improves significantly.

The item applying fundamental principles of computer security, received the lowest mean score of 4.01 among the seven items. Though interpreted as advanced, this indicates that among the core ethical and safety competencies, computer security principles is an area where teachers may have comparatively less proficiency or confidence. Fundamental computer security measure includes practices such as using strong and regularly updated passwords, enabling multi-factor authentication, recognizing and avoiding phishing attempts, securing personal and institutional data, updating software to avoid vulnerabilities, and being aware of malware and virus threats. These practices are essential in safeguarding not just personal data, but also the institutional systems and student records educators interact with daily. The relatively lower score in this area suggests a potential gap in practical application, awareness, or institutional emphasis on security protocols. This is a concern because in a highly digitized educational landscape, teachers are handling increasingly sensitive information, engaging in cloud-based interactions, using LMS, and relying on third-party applications. All of which pose significant cybersecurity risks if not managed properly. Without strong computer security practices, even minor lapses can result to breaches that affect student data privacy, disrupt instructional processes, or damage institutional credibility.

### **Problem 3. What is the perception of teachers about ICT integration in teaching?**

Table 8 presents the perception of teachers about ICT integration in teaching.

The results show that teachers have a positive perception of ICT integration in teaching as shown in the mean score of 3.49. This result reveals that teachers have an optimistic view about ICT integration. Their perception indicates that they recognize ICT as beneficial tools in modern classrooms. They also believe that ICT enhances teaching and learning.

Table 8 Perception of Teachers about ICT Integration in Teaching

| ICT Integration in Teaching                                                           | $\bar{x}$ | DE |
|---------------------------------------------------------------------------------------|-----------|----|
| 1. I feel confident learning new computer skills.                                     | 4.08      | P  |
| 2. I find it easier to teach by using ICT.                                            | 4.04      | P  |
| 3. I am aware of the great opportunities that ICT offers for effective teaching.      | 4.14      | P  |
| 4. I think that ICT supported teaching makes learning more effective.                 | 4.08      | P  |
| 5. The use of ICT helps teachers to improve teaching with more updated materials.     | 4.16      | P  |
| 6. I think the use of ICT improves the quality of teaching.                           | 4.18      | P  |
| 7. I think the use of ICT helps to prepare teaching resources and materials.          | 4.14      | P  |
| 8. The use of ICT enables the students` to be more active and engaging in the lesson. | 4.19      | P  |
| 9. I have more time to cater to students` need if ICT is used in teaching.            | 3.96      | P  |
| 10. I can still have an effective teaching without the use of ICT.                    | 3.53      | P  |
| 11. I think the use of ICT in teaching is a waste of time.                            | 2.24      | Ne |
| 12. I am confident that my students learn best without ICT used in teaching.          | 2.86      | Ne |
| 13. The classroom management is out of control if ICT is used in teaching.            | 2.20      | N  |
| 14. Students pay less attention when ICT is used in teaching.                         | 2.12      | N  |
| 15. Students make no effort for their lesson if ICT is used in teaching.              | 2.39      | N  |
| <b>Mean</b>                                                                           | 3.49      | P  |

Legend:

| Statistical Limits | Descriptive Equivalent |
|--------------------|------------------------|
| 4.21-5.00          | Very Positive (VP)     |
| 3.41-4.20          | Positive (P)           |
| 2.61-3.40          | Neutral (Ne)           |
| 1.81-2.60          | Negative (N)           |
| 1.00-1.80          | Very Negative (VN)     |

Among these indicators, teachers believe that ICT enables the students to be more active and engaging in the lesson and improves the quality of teaching as shown in the means score 4.19 and 4.18, respectively. These results show that through ICT tools, students become more engaged and active. With the use of ICT, teachers can design learner-centered instruction by integrating multimedia formats, interactive simulations, and gamified platforms. Moreover, teachers believe that with ICT, quality of teaching is improved through fostering learner-centered activities which engages engagement and motivation. If digital tools are used to supplement the teaching and learning process, learners` learning environment becomes more interesting. This is supported with the observation that when students are requested to conduct reporting in the classroom, the use of presentation allows the class to be more active and engaging compared to a reporting that uses the traditional approach of reading notes.

The negative perception for items 13, 14, and 15 further validate this positive trend. Teachers disagree that students pay less attention when ICT is used in the classroom, as shown in the mean of 2.12. This suggests that teacher strongly believe that technology is a good tool to catch the attention of learners. Teachers` negative perception in this item also highlights the role of gamified activities and interactive tools. Teachers likewise do not believe that classroom management is out of control if ICT is used in teaching as shown in the mean score of 2.20. This implies that they see ICT tools as an effective aid to ensure that students are properly managed. Learners nowadays are fond of technology. Based on the report of DICT, an individual has an average of eight-hour screen time a day. This is a factor why students are easily managed when they see something on screens through technological tools. Similarly, teachers also do not believe that students make no effort for their lesson if ICT is used in teaching as shown in the mean score of 3.39. This suggests that they believe learners make effort even when ICT is used in their classrooms. These findings are supported by Albion et al. (2015), Allenezi et al. (2023), Alhassan and Adam (2021), and Bhattacharjee and Deb (2023) who similarly claimed that ICT fosters engaging classrooms, and strengthens students` interest. This perception is important as Instefjord and Munthe (2017) underscored that positive acceptance to ICT integration leads to an effective and efficient learning process.

#### **Problem 4. Is there a significant difference on the ICT competence of teachers when grouped as to their profile?**

Table 9 below presents the significant difference of teachers ICT skills when grouped according to the type of HEI they belong to.

Table 9 t-test Results on ICT Competence of Teachers as to Type of HEI

|             | Public |      | Private |      | t(74) | p-value |
|-------------|--------|------|---------|------|-------|---------|
|             | M      | SD   | M       | SD   |       |         |
| Type of HEI | 4.29   | 0.68 | 4.22    | 0.66 | 0.36  | 0.72    |

\*.05 level of significance

The result shows that there is no significant difference when teachers are grouped according to the type of HEI they belong to with the p-value of 0.72. This suggests that whether teachers are in public or private HEI, their ICT skills are greatly needed in today`s learning environment. This, further implies that academic standards or professional expectations remain consistent across the sector, regardless of the type of HEI. This consistency is aligned with national educational mandates like CHED Memorandum Order (CMO) No. 4, Series of 2020 requiring all public and private HEIs to adopt flexible learning modes, and CHED-DICT Memorandum of Understanding (2023) that sets a benchmark for relevant and quality education, forcing both SUCs (public) and private colleges to digitize their record-keeping, student services, and instructional delivery to stay compliant with national digital roadmap targets, all of which require uniform competency standards across all sectors, ensuring that academic expectations for ICT integration remain a universal benchmark rather than a localized privilege. This is further addressed by good mentorship programs implemented by schools.

Table 10 presents the significant difference of teachers ICT skills when grouped according to years of service.

Table 10 ANOVA Results on ICT Competence of Teachers as to Years in Service

| Sources of Variation | SS           | df        | MS   | F    | p-value | F Crit |
|----------------------|--------------|-----------|------|------|---------|--------|
| Between Groups       | 4.64         | 3         | 1.55 | 3.84 | 0.01    | 2.74   |
| Within Groups        | 28.22        | 70        | 0.40 |      |         |        |
| <b>Total</b>         | <b>32.86</b> | <b>73</b> |      |      |         |        |

\*.05 level of significance

A significant difference was found in the years of teaching service as shown in the p-value of 0.01. The result reveals that teaching experience matters in developing ICT competence of teachers. As teachers gain experience, this impacts their perspective of the teaching profession and pedagogical knowledge grow broader and deeper resulting to higher and better competence. However, the result might also be influenced by the fact that teachers who have been in the teaching profession for long period of time have had more opportunities for professional development and institutional training over time. Conversely, the rapid pace of technological change could create a digital gap where the varying levels of exposure to modern software during one's formative teaching years significantly shapes current ICT proficiency.

Table 11 below presents the significant difference of teachers ICT skills when grouped according to generation.

Table 11 ANOVA Results on ICT Competence of Teachers as to Generation

| Sources of Variation | SS           | df        | MS   | F    | p-value | F Crit |
|----------------------|--------------|-----------|------|------|---------|--------|
| Between Groups       | 4.35         | 3         | 1.45 | 3.56 | 0.02    | 2.74   |
| Within Groups        | 28.51        | 70        | 0.41 |      |         |        |
| <b>Total</b>         | <b>32.86</b> | <b>73</b> |      |      |         |        |

\*.05 level of significance

The results showed a significant difference with a p-value of 0.02, which highlights that age group, such as Millennials or Gen X, interact with their professional environment in fundamentally different ways. It shows that diverse perception of teachers on ICT integration in teaching, educational philosophies, and technological fluencies is inherent in their generation. The generation group of teachers are significant factors affecting their ICT competence (Fernandez-Cruz & Fernandez-Diaz, 2015; Salleh et al., 2023) Similarly, Pegler et al. (2010) pointed out that younger teachers demonstrate noticeable confidence and a higher potential for technology integration in contrast to their older colleagues.

### **Problem 5. What enhancement program can be implemented to improve teachers` ICT integration and perception towards effective teaching?**

The research findings reveal that while educators in Abra demonstrate a Proficient level of competency in fundamental ICT tasks and maintain a positive outlook toward digital integration, specific technical gaps in troubleshooting and complex data management persist. These results underscore a critical need to transition from basic digital literacy to a more sophisticated, self-sufficient mastery of technology to minimize instructional downtime and maximize data-driven teaching.

Consequently, the following enhancement program is proposed to bridge these identified gaps, ensuring that teachers are fully equipped to meet the evolving demands of the 21st-century classroom.

### **Proposed Intervention Plan**

#### **Project Strategic High-level ICT Facilitation for Teachers (SHIFT)**

#### **Rationale**

The rapid digital transformation of the global educational landscape necessitates a proactive shift in pedagogical approaches. Project SHIFT is designed to address the critical gaps between possessing technological tools and the actual competence required to integrate them meaningfully into the classroom. This program is essential to ensure that educators do not merely using computers, but leverage high-level ICT

strategies to enhance student learning outcomes; possess high-level of self-dependency in solving minor technical issues while operating them, and observes highest ethical technological practices.

Studies indicate that while many educators have basic digital literacy, there is a significant need for mastery in high-level ICT facilitation such as diagnosing technical problems, advance skill in technical data entry while using spreadsheet, formatting and improving visuals of presentations, and data safeguarding. Project SHIFT provides the necessary structured professional development to move teachers in a more responsive technological knowledge.

Project SHIFT is a strategic plan to be provided for the teachers to empower them become proficient ICT facilitators. The program directly improves the quality of education provided to students. This intervention ensures that schools remain competitive and relevant, transforming the classroom into a space where technology seamlessly supports critical thinking, creativity, and student engagement. This shift is not just an upgrade in tools, but a fundamental evolution of teaching excellence.

## Goals

This intervention plan enables teachers to:

1. fix common computer and software issues on their own, reducing the need for outside technical help during class;
2. develop skill in spreadsheet functions, specifically the creation of complex formulas and automated workbooks, enabling them to engage in more efficient, evidence-based tracking of student performance;
3. elevate presentation formatting skills to ensure that all instructional materials are professionally structured, inclusive, and optimized for diverse learning modalities; and
4. enhance their skills in cyber security.

## Implementation Plan

| Challenges/Issues                                                                         | Objective                                                                                                                       | Activities/ Strategies (Intervention)                                                                                                                | Expected Output                                                                                                        | Time Frame                                               | Person Involved                                                |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------|
| Proficiency in troubleshooting hardware and software issues                               | To empower teachers to independently diagnose and resolve common technical problems to minimize instructional downtime          | A hands-on workshop where teachers practice resolving connectivity, peripheral, and software errors.                                                 | A personalized Troubleshooting Quick-Guide for teachers, and reduction in IT support tickets for minor issues          | During in-service trainings (INSET) in between semesters | IT specialists, teachers, and administrators                   |
| Creating complex formulas and automated workbooks in Spreadsheets                         | To train teachers how to turn basic data entry to advanced analytical proficiency for evidence-based student tracking           | Training on logical functions (IF, VLOOKUP) and conditional formatting to create automated grading systems.                                          | Enhanced automated, error-free class records and student performance dashboards developed by the faculty               | During in-service trainings (INSET) in between semesters | IT specialists, and teachers,                                  |
| Advanced document formatting and printing specific presentation slides                    | To enhance visual literacy and design skills, ensuring instructional materials are professional, inclusive, and well-structured | Training on advanced Word and Presentation styles, headers/footers, and the principles of non-cluttered presentation design.                         | Standardized, professionally formatted institutional modules and accessible presentation templates for all departments | During in-service trainings (INSET) in between semesters | IT specialists, Education Technology specialist, and teachers, |
| Application of computer security principles despite high understanding of property rights | To enhance the application of cyber-stewardship and safeguard institutional and student data against emerging threats.          | The "Cyber-Steward" Certification: A simulation-based training on Multi-Factor Authentication (MFA), phishing recognition, and secure data handling. | 100% compliance with institutional data privacy protocols                                                              | During in-service trainings (INSET) in between semesters | Data Protection Officer, teachers, and administrators          |

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter provides the summary of the findings, the conclusion based from the results of the study and recommendations forwarded by the researcher.

### Summary of Findings

The following are the key findings of the study based on the data gathered:

- 1. On the profile of the respondents.** The study involved teachers from the public sector, with sixty (81.08%) affiliated with Public HEIs and fourteen (18.92%) from Private HEIs. In terms of years of teaching a majority of respondents with thirty (40.54%) are veteran teachers with 10 years or more of experience, they are followed by a group of seventeen (22.97%) teachers in their fourth to sixth year in teaching. On generation, the teaching population is primarily composed of Generation X and Generation Z, each consists of twenty-five (33.78%) teachers.
- 2. On the level of ICT competence.** The study reveals a strong foundation of digital literacy among the teachers, with performance consistently rated between proficient and advanced. The highest level of mastery is found in Word Processing (4.51), where teachers are categorically proficient, followed closely by Presentation (4.37). Teachers also maintain an advanced standing in Ethics and Security (4.18), indicating a solid grasp of digital safety and professional standards. In terms of advanced technical skills, the faculty demonstrates significant competence in Information Communication (4.24) and Spreadsheets (4.20), both falling within the advanced range. Additionally, the teachers show an advanced level of competence in ICT Basics (4.12).
- 3. On perception of ICT integration.** Teachers' overall perception is positive (3.49). They believe that through ICT integration, students become more interested and engaged in the classroom activities (4.19), it improves quality of learning (4.18), and enhance teaching with more updated materials (4.16).
- 4. On significant difference.** The study reveals that teachers' ICT competence has no significant difference when grouped according to the type of HEI they belong to as evident in the p-value 0.72. However, there is a significant difference on the ICT competence of teachers when grouped according to the years of service and the generation they belong to as shown in the p-value of 0.01 and 0.02, respectively.

### Conclusions

Based on the findings, the following conclusions are drawn:

The integration of Information and Communication Technology (ICT) within the pedagogical framework of higher education is no longer an elective enhancement but a fundamental necessity. This research has demonstrated that while there is a significant baseline of digital literacy among educators, a measurable gap persists between basic tool usage and advanced instructional integration.

The teaching landscape in Abra's higher education institutions is largely defined by a seasoned group of public school teachers, whose extensive experience serves as a vital benchmark for pre-service teachers. These veteran teachers possess a strong competency in fundamental ICT domains including word processing, spreadsheets, presentations, and computer ethics, providing a strong technological foundation for future teachers to emulate. This technical proficiency is further enhanced by a positive perception of ICT integration, which empowers faculty to navigate into the increasingly complex digital environments. The full willingness of these teachers to incorporate technology into their pedagogy fosters a more active and engaging classroom, ensuring that the teaching-learning process remains both dynamic and impactful.

Furthermore, the active participation of teachers is clearly reflected in their alignment with the Technological Pedagogical Content Knowledge (TPCK) framework. These teachers demonstrate a good balance of technological, pedagogical, and content knowledge, ensuring that the next generation of educators in Abra is mentored by faculty who excel in more than just traditional instruction. By mastering the intersections of technological pedagogical knowledge and technological content knowledge, these educators provide a nurturing environment where pre-service teachers can thrive. Ultimately, as emphasized by the TPCK framework, teachers who possess this integrated expertise are uniquely equipped to train future-ready professional teachers who are highly responsive to the demands of 21st-century learning.

## Recommendations

The following recommendations are proposed to address the gaps identified in the study:

1. Deans and program heads may provide teachers series of training and workshop that would enhance their digital literacy. Specifically, teachers should be provided upskilling support in the following areas:
  - a. computer troubleshooting;
  - b. file formatting skills in word processing;
  - c. formula creation and formatting in spreadsheet;
  - d. address book creation and bookmark usage in web searching; and
  - e. fundamental principles of computer security.
2. School administrators may build education technology rooms that consist of technology tools, like computer sets, television, projectors, printers, speakers, and other audio-visual materials necessary to cultivate teachers' positive perception towards ICT integration in teaching.
3. Teacher Education deans and heads may implement the proposed intervention plan.

## REFERENCES

1. Adams, C. (2019, July 12). TPACK model: The ideal modern classroom. Pressbooks. <https://pressbooks.pub/techandcurr2019/chapter/tpack-modern-classroom/>
2. Afridi, T., & Chaudhry, A. H. C. (2019). Technology adoption and integration in teaching and learning at public and private universities in Punjab. *Bulletin of Education and Research*, 41(2), 121–143. <https://files.eric.ed.gov/fulltext/EJ1229437.pdf>
3. Alazam, A.-O., Bakar, A. R., Hamzah, R., & Asmiran, S. (2012). Teachers' ICT skills and ICT integration in the classroom: The case of vocational and technical teachers in Malaysia. *Scientific Research*, 3. <https://www.scirp.org/html/26757.html>
4. Al-Bataineh, A., Anderson, S., Toledo, C., & Wellinski, S. (2008, September 22). A study of technology integration in the classroom. Document - Gale Academic OneFile. <https://go.gale.com/ps/i.do?id=GALE%7CA273359028&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=00921815&p=AONE&sw=w&userGroupName=anon%7Ebc90026e&aty=open-web-entry>
5. Albion, P. R., Tondeur, J., Forkosh-Baruch, A., & Peeraer, J. (2015). Teachers' professional development for ICT integration: Towards a reciprocal relationship between research and practice. *Education and Information Technologies*, 20(4), 655–673. <https://doi.org/10.1007/s10639-015-9401-9>
6. Alenezi, M., Wardat, S., & Akour, M. (2023). The need of Integrating digital education in higher Education: challenges and opportunities. *Sustainability*, 15(6), 4782. <https://doi.org/10.3390/su15064782>
7. Alhassan, M. D., & Adam, I. O. (2021). The effects of digital inclusion and ICT access on the quality of life: A global perspective. *Technology in Society*, 64, 101511. <https://doi.org/10.1016/j.techsoc.2020.101511>

8. Alkahtani, A. (2017, April 30). The challenges facing the integration of ICT in teaching in Saudi secondary schools. *Learning & Technology Library* (LearnTechLib). <https://www.learntechlib.org/p/180215/>
9. Almeqdadi, A. G. a. a. F. A. (2010). Teachers' perceptions of technology integration in the United Arab Emirates school classrooms. *Educational Technology & Society*, 13(1), 165–175. <https://www.jstor.org/stable/jeductechsoci.13.1.165>
10. Altakhneh, B. H., & Abumusa, M. (n.d.). Attitudes of University Students towards STEM Approach. <https://eric.ed.gov/?id=EJ1264210>
11. Altnay, F. (2019). The role of technology in education. In *IntechOpen eBooks*. <https://doi.org/10.5772/intechopen.77620>
12. Ansi, A. M. A., & Fatmawati, I. (2023). Integration of ICT in higher education during COVID-19 pandemic: a case study. *International Journal of Learning and Change*, 15(4), 430–442. <https://doi.org/10.1504/ijlc.2023.132132>
13. Arnseth, H. C., & Hatlevik, O. E. (2010). Challenges in Aligning Pedagogical Practices and Pupils' Competencies with the Information Society's Demands. In *IGI Global eBooks* (pp. 266–280). <https://doi.org/10.4018/978-1-61520-909-5.ch014>
14. Aslan, A., & Zhu, C. (2015). Pre-Service Teachers' perceptions of ICT integration in teacher education in Turkey. <https://eric.ed.gov/?id=EJ1067711>
15. Aud, S., Wilkinson-Flicker, S., Kristapovich, P., Rathbun, A., Wang, X., & Zhang, J. (n.d.). The Condition of Education 2013. NCES 2013-037. <https://eric.ed.gov/?id=ED542714>
16. Balajadia, D. (2015). Gauging the ICT-based teaching readiness of preservice teachers in the light of 21st century education. *Global Research and Development Services*, 1(1). <https://grdspublishing.org/index.php/people/article/view/79>
17. Bhattacharjee, B., & Deb, K. (2022). Role of ICT in 21st Century's Teacher Education. *International Journal of Education and Information Studies*, 6(1), 1–6.
18. Bingimlas, K. (2018). Investigating the level of teachers' Knowledge in Technology, Pedagogy, and Content (TPACK) in Saudi Arabia. *South African Journal of Education*, 38(3), 1–12. <https://doi.org/10.15700/saje.v38n3a1496>
19. Bonifacio, A. (2018). Developing Information Communication Technology (ICT) curriculum standards for K-12 schools in the Philippines. University of the Philippines. <https://linc.mit.edu/linc2013/proceedings/Session7/Session7Bonifacio.pdf>
20. Budhedeo, S. H. (2016). Issues and challenges in bringing ICT enabled education to rural India. *International Journal of Scientific Research and Education*, 4(1). <https://doi.org/10.18535/ij sre/v4i01.01>
21. Cabato, L. (2023). CHED, DICT to integrate technology in higher education sector. In *Commission on Higher Education*. [https://mb.com.ph/2023/5/30/ched-dict-to-integrate-technology-in-higher-education-sector?utm\\_source=](https://mb.com.ph/2023/5/30/ched-dict-to-integrate-technology-in-higher-education-sector?utm_source=)
22. Capan, S. A. (2012). Teacher attitudes towards computer use in EFL classrooms. *Frontiers of language and teaching*, 3(2), 248-254.
23. Cassim, K. M., & Obono, E. (2012). On the factors affecting the adoption of ICT for the teaching of word problems. *WCECS*, 1. [https://www.iaeng.org/publication/WCECS2011/WCECS2011\\_pp269-276.pdf](https://www.iaeng.org/publication/WCECS2011/WCECS2011_pp269-276.pdf)
24. Castro, L. (2018). Deriving insights from the NCBTS results: Inputs for Teacher Development in the dawn of the Postimplementation. *The SUMMIT 2018*, 284–320. <https://rpo.ua.edu.ph/wp-content/uploads/2023/10/8.-Summit-2018-Deriving-Insights-284-320.pdf>
25. Cottrell, S. (2024, December 20). A Year-by-Year guide to the different generations. *Parents*. <https://www.parents.com/parenting/better-parenting/style/generation-names-and-years-a-cheat-sheet-for-parents/>
26. Crisolo, N. (2018). Sharpening education through the use of information and communications technology. *Institute of Education Research*. <https://files.eric.ed.gov/fulltext/ED586949.pdf>
27. Dela Fuente, J., & Biñas, L. (2020). Teachers' Competence in Information and Communications Technology (ICT) as an Educational tool in teaching: An Empirical Analysis for Program Intervention. *Journal of Research in Education, Science and Technology*, 5(2), 61–76. [https://www.researchgate.net/profile/Jayson-Dela-Fuente/publication/350466721\\_Teachers'\\_Competence\\_in\\_Information\\_and\\_Communications\\_Technology\\_ICT\\_as\\_an\\_Educational\\_Tool\\_in\\_Te](https://www.researchgate.net/profile/Jayson-Dela-Fuente/publication/350466721_Teachers'_Competence_in_Information_and_Communications_Technology_ICT_as_an_Educational_Tool_in_Te)

[achieving An Empirical Analysis for Program Intervention/links/6061d2c4299bf17367792731/Teachers-Competence-in-Information-and-Communications-Technology-ICT-as-an-Educational-Tool-in-Teaching-An-Empirical-Analysis-for-Program-Intervention.pdf](https://www.rsisinternational.org/achieving-An-Empirical-Analysis-for-Program-Intervention/links/6061d2c4299bf17367792731/Teachers-Competence-in-Information-and-Communications-Technology-ICT-as-an-Educational-Tool-in-Teaching-An-Empirical-Analysis-for-Program-Intervention.pdf)

28. Diagnostic Assessment Report – Philippines Country Report. (2022, March). Technology-Enabled Innovation in Education in Southeast Asia (TIESEA). <https://tiesea.org/philippines/>
29. Dudeney, G., & Hockly, N. (2012). ICT in ELT: how did we get here and where are we going? *ELT Journal*, 66(4), 533–542. <https://doi.org/10.1093/elt/ccs050>
30. Elsa, E., & Anwar, K. (2021). The perception of using technology Canva Application as a media for English teacher creating media virtual teaching and English learning in Loei Thailand. *Journal of English Teaching Literature and Applied Linguistics*, 5(1), 62. <https://doi.org/10.30587/jetlal.v5i1.2253>
31. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change. *Journal of Research on Technology in Education*, 42(3), 255–284. <https://doi.org/10.1080/15391523.2010.10782551>
32. ErümiT, S. F., & Keleş, E. (2021). Lessons from K-12 Education in Asia-Pacific Countries Successful in the PISA: ICT Integration Dimension. *Sakarya University Journal of Education*, 11(3), 452–481. <https://doi.org/10.19126/suje.940080>
33. Fernández-Cruz, F., & Fernández-Díaz, M. (2015). Generation Z's teachers and their digital skills. *Comunicar*, 24(46), 97–105. <https://doi.org/10.3916/c46-2016-10>
34. Ferrari, A., Brečko, B. N., & Punie, Y. (2014). DIGCOMP: A framework for developing and understanding digital competence in Europe. In-Depth, 38. *eLearning Papers*. [www.openeducationeuropa.eu/en/elearning\\_papers](http://www.openeducationeuropa.eu/en/elearning_papers)
35. Fitri, P. I. M., & Efendi, R. (2024). The need for developing Canva-based interactive learning media to improve students' literacy abilities. *Journal Regy Research in Education and Technology*, 2(2), 50–59. <https://journalregy.com/index.php/uvw/article/view/109/46>
36. Foutsitzi, S., & Caridakis, G. (2019). ICT in Education: benefits, challenges and new directions. *IEEE Xplore*, 1–8. <https://doi.org/10.1109/iisa.2019.8900666>
37. Ghavifekr, S., & Rosdy, W. a. W. (2015). Teaching and Learning with Technology: Effectiveness of ICT Integration in Schools. <https://eric.ed.gov/?id=EJ1105224>
38. Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. (2016). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441–449. <https://doi.org/10.1016/j.chb.2016.11.057>
39. Gusen, J. , & Gusen, N. (n.d.). Computer Skills: Prospects and Challenges. *American Journal of Humanities and Social Sciences Research (AJHSSR)*, 4(6), 135–144. <http://www.ajhssr.com/wp-content/uploads/2020/06/R2046135144.pdf>
40. Harry, A., & Sayudin, S. (2023). Role of AI in education. *Interdisciplinary Journal and Hummanity (INJURITY)*, 2(3), 260-268.
41. Heitink, M., Voogt, J., Fisser, P., Verplanken, L., & Van Braak, J. (2017). Eliciting teachers' technological pedagogical knowledge. *Australasian Journal of Educational Technology*, 33(3). <https://doi.org/10.14742/ajet.3505>
42. Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change. *Journal of Curriculum Studies*, 37(2), 155–192. <https://doi.org/10.1080/0022027032000276961>
43. Hermawan, H. D., Deswila, N., & Yunita, D. N. (2018). Implementation of ICT in Education in Indonesia During 2004-2017. *IEEE Xplore*, 108–112. <https://doi.org/10.1109/iset.2018.00032>
44. Hero, J. (2020). Teachers' preparedness and acceptance of Information and Communications technology (ICT) integration and its effect on their ICT integration practices. *Social Science Open Access Repository*, 1, 59–76. <https://www.ssoar.info/ssoar/handle/document/76732>
45. Hinostroza, J. E. (2017). New challenges for ICT in education policies in developing countries: The need to account for the widespread use of ICT for teaching and learning outside the school. In *Springer eBooks* (pp. 99–119). [https://doi.org/10.1007/978-3-319-67657-9\\_5](https://doi.org/10.1007/978-3-319-67657-9_5)
46. Implementation of ICT skills for the students for their employment in skill-based jobs. (n.d.). Google Books. [https://books.google.com.ph/books?hl=tl&lr=&id=a02uEAAAQBAJ&oi=fnd&pg=PA1&dq=shyamal+majumdar+ICT+in+education&ots=7TLUIhV1G\\_&sig=uazv0fEIR6gSUJQ3wreI6\\_lHuvk&redir\\_esc=y#v=onepage&q=shyamal%20majumdar%20ICT%20in%20education&f=false](https://books.google.com.ph/books?hl=tl&lr=&id=a02uEAAAQBAJ&oi=fnd&pg=PA1&dq=shyamal+majumdar+ICT+in+education&ots=7TLUIhV1G_&sig=uazv0fEIR6gSUJQ3wreI6_lHuvk&redir_esc=y#v=onepage&q=shyamal%20majumdar%20ICT%20in%20education&f=false)

47. Information and Communication Technologies (ICT) | AIMS. (n.d.). <https://aims.fao.org/information-and-communication-technologies-ict>
48. Instefjord, E., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37-45.
49. Jadhav, V. (2011). ICT and teacher education. *International Educational e-Journal*, 11.
50. Kamper, S. (2020). Types of research Questions: Descriptive, predictive, or causal. *Journal of Orthopaedic & Sports Physical Therapy*, 50(8), 468–469. <https://www.jospt.org/doi/epdf/10.2519/jospt.2020.0703>
51. Khashkhuu, A. (2017). ICT competency level of teacher in the Must. Research Gate. In press. [https://www.researchgate.net/profile/Ariunaa-Khashkhuu/publication/327668225\\_ICT\\_Competency\\_Level\\_of\\_Teacher\\_in\\_the\\_MUST/links/5b9d1c29a6fdccd3cb5a6325/ICT-Competency-Level-of-Teacher-in-the-MUST.pdf](https://www.researchgate.net/profile/Ariunaa-Khashkhuu/publication/327668225_ICT_Competency_Level_of_Teacher_in_the_MUST/links/5b9d1c29a6fdccd3cb5a6325/ICT-Competency-Level-of-Teacher-in-the-MUST.pdf)
52. Khatua, P. K. (2012). ICT in Higher Education: Opportunities and challenges. *Bhatter College Journal of Multidisciplinary Studies*, 2. <https://bcjms.bhattercollege.ac.in/ict-in-higher-education-opportunities-and-challenges/?prsrc=3>
53. Koehler, M. J., Punya, M., & Cain, W. (2013). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193 (3), 13-19. <https://doi.org/10.1177/002205741319300303>
54. Koh, J. H. L., & Divaharan, S. (2011). Teacher professional development for ICT integration: towards a reciprocal relationship between research and practice. *Australian Journal of Educational Technology*, 27(1), 1-14
55. Krishnasamy, N. H. a. N., Omar, N. M., Ahmad, N. M., Yasin, N. A., Ibrahim, N. H., Soulignavong, N. L., & Vongsouangtham, N. B. (2022). The needs of Information and Communication Technology (ICT) tools for research development: a case in Laos. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, 28(3), 49–56. <https://doi.org/10.37934/araset.28.3.4956>
56. Kurt, S. (2019, September 16). TPACK: Technological Pedagogical Content Knowledge Framework - Educational Technology. *Educational Technology*. <https://educationaltechnology.net/technological-pedagogical-content-knowledge-tpack-framework/>
57. Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, 55(1), 79–105. <https://doi.org/10.1080/09523987.2018.1439712>
58. Liang, M., Lim, C. P., Park, J., & Mendoza, N. B. (2022). A review of ICT-enabled learning for schoolgirls in Asia and its impacts on education equity. *Educational Technology Research and Development*, 71(2), 267–293. <https://doi.org/10.1007/s11423-022-10178-w>
59. Lim, C. P., & Chai, C. S. (2007). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons. *British Journal of Educational Technology*, 39(5), 807–828. <https://doi.org/10.1111/j.1467-8535.2007.00774.x>
60. Lubuva, E. E., Ndibalema, P., & Mbwanbo, E. (2022). Assessment of Tutors' Level of ICT Competencies in Teaching in Teacher Education in Tanzania. *Journal of Learning for Development*, 9(3), 436–454. <https://doi.org/10.56059/jl4d.v9i3.705>
61. Luz, G. (2021). World Economic Forum (WEF) Global Competitiveness Report Philippines vs ASEAN (2010 - 2017). In *National Competitiveness Council Philippines*. <http://www.competitive.org.ph/rankings/wef-globalcompetitivenessreport.php>
62. Macapugas, D., Dagami, R., & Anadia-Macapugas, A. J. (2023). Assessing the proficiency and factors influencing public high school science teachers' video editing and production skills for enhanced instructional presentations. *International Journal of Research and Innovation in Social Science*, 7(12). <https://rsisinternational.org/journals/ijriss/articles/assessing-the-proficiency-and-factors-influencing-public-high-school-science-teachers-video-editing-and-production-skills-for-enhanced-instructional-presentations/>
63. Mahmud, R., & Hj. Ismail, M. A. (2010). Impact of training and experience in using ICT on In-Service Teachers' basic ICT literacy. *Malaysian Journal of Educational Technology*, 10(2). <https://www.ictesolutions.com.au/media/1839/1-v10n2-rosnaini-teachers-ict-literacy.pdf>
64. Mallillin, L. L., & Mallillin, J. (2019). Competency skills and performance level of faculties in the higher education institution (HEI). *European Journals of Education*, 6(9). <https://oapub.org/edu/index.php/ejes/article/view/2746>

65. Marcial, D., & De La Rama, P. (2015). ICT competency level of teacher education professionals in the central Visayas Region, Philippines. *Asia Pacific Journal of Multidisciplinary Research*, 3(5), 28–38.
66. Mubinakhon, I., & Anaskhon, I. M. (2021). The Importance of Using the I.c.t. to Increase the Efficiency of Education. *Neliti*. <https://www.neliti.com/publications/336178/the-importance-of-using-the-ict-to-increase-the-efficiency-of-education>
67. Ngao, A. I., Sang, G., & Kihwele, J. E. (2022). Understanding Teacher Educators' Perceptions and Practices about ICT Integration in Teacher Education Program. *Education Sciences*, 12(8), 549. <https://doi.org/10.3390/educsci12080549>
68. Nunes-Silva, L., Malacarne, A., Macedo, R. F., & De-Bortoli, R. (2019). Generation of intangible assets in higher education institutions. *Scientometrics*, 121(2), 957–975. <https://doi.org/10.1007/s11192-019-03226-5>
69. Ober, J., Matushevych, T., & Strutynska, O. (2025). From challenges to opportunities: Using ICT and AI in Ukrainian education in times of pandemic and War. *Journal of Open Innovation Technology Market and Complexity*, 11(4), 100639. <https://doi.org/10.1016/j.joitmc.2025.100639>
70. Ogwu, E. N., & Ogwu, F. C. (2016). Comparative Analysis of Microsoft Package (MSP) Competence among Teacher Trainee Students in Botswana and Nigeria: Implications for Curriculum Practices. <https://eric.ed.gov/?id=EJ1115973>
71. Okigbo, E. C., & Enemuo, C. J. (2021). Acquisition of computer literacy skills in teaching and research by lecturers in Colleges of Education in SouthEast Nigeria. *IOSR Journal of Research & Method in Education*, 11(5). [https://www.academia.edu/53154543/Acquisition\\_of\\_Computer\\_Literacy\\_Skills\\_in\\_Teaching\\_and\\_Research\\_By\\_Lecturers\\_In\\_Colleges\\_Of\\_Education\\_In\\_South\\_East\\_Nigeria](https://www.academia.edu/53154543/Acquisition_of_Computer_Literacy_Skills_in_Teaching_and_Research_By_Lecturers_In_Colleges_Of_Education_In_South_East_Nigeria)
72. Ounis, T. (2016). Addressing the integration of ICT into teaching and identification of the potential factors motivating teachers to use ICT. *International Journal of Humanities and Cultural Studies*, 3(4), 1099–1114.
73. Pagal, J. (2017). Information and communication technology use in Philippine public and private schools. [www.academia.edu](https://www.academia.edu). [https://www.academia.edu/30938474/INFORMATION\\_AND\\_COMMUNICATION\\_TECHNOLOGY\\_USE\\_IN\\_PHILIPPINE\\_PUBLIC\\_AND\\_PRIVATE\\_SCHOOLS?utm\\_source=chatgpt.com](https://www.academia.edu/30938474/INFORMATION_AND_COMMUNICATION_TECHNOLOGY_USE_IN_PHILIPPINE_PUBLIC_AND_PRIVATE_SCHOOLS?utm_source=chatgpt.com)
74. Pardo, C. (2012). Information and Communication Technology Competence of the University of Northern Philippines - College of Teacher Education Faculty. *The UNP Research Journal*, 21. <https://vector.unp.edu.ph/index.php/1/article/view/256/243>
75. Paudel, P. (2020). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. <https://www.semanticscholar.org/paper/Online-Education%3A-Benefits%2C-Challenges-and-During-Paudel/2d193d66504adc38255af97e7b78871a0105d09e?p2df>
76. Pegler, K., Kollewyn, J., & Crichton, S. (2010, July 1). Generational attitudes and teacher ICT use. *Learning & Technology Library (LearnTechLib)*. <https://www.learntechlib.org/p/28280/>
77. Pradhan, J. S. (2018). Innovations and initiatives in teacher education. *Zenith International Journal of Multidisciplinary Research*, 8(5), 116–124. <https://www.indianjournals.com/ijor.aspx?target=ijor:zijmr&volume=8&issue=5&article=011>
78. Qizi Nasirdinova, M. H., & Minamatov, Y. E. O. (2022). Application of ICT in education and teaching technologies. *Scientific Progress*, 3(4), 738–740. <http://sjifactor.com/passport.php?id=22257>
79. Quiambao, D.T., Baking, E.G., Buenviaje, L.B., Nuqui, A.V., Cruz, R.C. (2015). Predictors of Board Exam Performance of the DHVTSU College of Education Graduates. *Journal of Business & Management Studies*, 1(1). 1-4
80. Ra, S., Chin, B., & Lim, C. P. (2016). A holistic approach towards Information and Communication Technology (ICT) for addressing education challenges in Asia and the Pacific. *Educational Media International*, 53(2), 69–84. <https://doi.org/10.1080/09523987.2016.1211334>
81. Rathee, N., & Saini, S. (2022). ICT empowered teacher education in today's era. *International Journal of Research and Analytical Review (IJRAR)*, 9(3), 511–515. [https://www.researchgate.net/profile/Neeru-Rathee-2/publication/363884554\\_ICT\\_EMPOWERED\\_TEACHER\\_EDUCATION\\_IN\\_TODAY'S\\_ERA/links/6333370a13096c2907d434cd/ICT-EMPOWERED-TEACHER-EDUCATION-IN-TODAYS-ERA.pdf](https://www.researchgate.net/profile/Neeru-Rathee-2/publication/363884554_ICT_EMPOWERED_TEACHER_EDUCATION_IN_TODAY'S_ERA/links/6333370a13096c2907d434cd/ICT-EMPOWERED-TEACHER-EDUCATION-IN-TODAYS-ERA.pdf)

82. Regañon, A. (2024). Teachers' level of ICT skills and their perceptions of integrating information and communication technology (ICT) in teaching. *International Journal Of Advanced Multidisciplinary Studies*, 4(4).
83. Roblin, Tondeur, J., N.P., Voogt, J., Bruggeman, B., Mathieu, G. & van Braak, J. (2018). Practical considerations informing teachers' technology integration decisions: The case of tablet, PCs. *Technology, Pedagogy, and Education*, 27(2), 165-181.
84. Rokenes, F., & Krumsvik, R. (2016). Prepared to teach ESL with ECT? A study of digital competence in Norwegian teacher education. *Computers & Education*, 97, 1-20.
85. Rubio, J., & Saenz, C. (2023). Pre-Service Teacher competence in a teacher education institution. *The QUEST Journal of Multidisciplinary Research and Development*, 2(2). <https://doi.org/10.60008/thequest.v2i2.78>
86. Saif, S. M., Ansarullah, S. I., Othman, M. T. B., Alshmrany, S., Shafiq, M., & Hamam, H. (2022). Impact of ICT in modernizing the global education industry to yield better academic outreach. *Sustainability*, 14(11), 6884. <https://doi.org/10.3390/su14116884>
87. Salleh, A. B., Phon, D. N. E., Rahman, N. S. A., Hashim, S. B., & Lah, N. H. C. (2023). Examining the correlations between teacher profiling, ICT skills, and the readiness of integrating augmented reality in education. *IEEE Xplore Logo - Link to Home*, 303–308. <https://doi.org/10.1109/icsecs58457.2023.10256377>
88. Sarkar, S. S. (2012). The role of Information and Communication Technology (ICT) in higher education for the 21st century. *The Science Probe*, 1(1). <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=8582a7d8de9ca9172fbfd548af9c63e763e53e7d>
89. Saubern, R., Urbach, D., Koehler, M., & Phillips, M. (2019). Describing increasing proficiency in teachers' knowledge of the effective use of digital technology. *Computers & Education*, 147, 103784. <https://doi.org/10.1016/j.compedu.2019.103784>
90. Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, F. (2020). Profiling teachers' readiness for online teaching and learning in higher education: Who's ready? *Computers in Human Behavior*, 118, 106675. <https://doi.org/10.1016/j.chb.2020.106675>
91. Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2017). The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge: Comparing structural equation modeling approaches. *Computers in Human Behavior*, 80, 67–80. <https://doi.org/10.1016/j.chb.2017.11.003>
92. Schmidt, D., Baran, E., Thompson, A., Mishra, P., Koehler, M., & Shin, T. (2009). Technological Pedagogical Content Knowledge (TPACK): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, 42(2), 123–149. <https://files.eric.ed.gov/fulltext/EJ868626.pdf>
93. 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>
94. Shoraevna, Z., Eleupanovna, Z., Tashkenbaevna, S., Zulkarnayeva, Z., Anatolevna, L., & Nurlanbekovna, U. (2021, February 12). Teachers' views on the use of information and communication technologies (ICT) in education environments. *Learning & Technology Library (LearnTechLib)*. <https://www.learntechlib.org/p/219032/>
95. Siddiquah, A., & Salim, Z. (2017). The ICT facilities, skills, usage, and the problems faced by the students of higher education. *Eurasia Journal of Mathematics Science and Technology Education*, 13(8). <https://doi.org/10.12973/eurasia.2017.00977a>
96. Slechtova, P. (2015). Attitudes of undergraduate students to the use of ICT in education. *Procedia - Social and Behavioral Sciences*, 171, 1128–1134. <https://doi.org/10.1016/j.sbspro.2015.01.218>
97. Summak, M. S., & Samancioğlu, M. (2011). Assessment of technology integration in vocational education and training schools. *International Journal of Education and Development Using ICT*, 7(1), 68-85.
98. Symaco, Education in South-East Asia. (n.d.). Google Books. [https://books.google.com.ph/books?hl=en&lr=&id=UGsDFAogOc4C&oi=fnd&pg=PA191&dq=education+status+in+the+philippines&ots=lKI648\\_vgM&sig=ZmCls0jI1WqccRrnnvWuX\\_VCzhU&redir\\_esc=y#v=onepage&q=education%20status%20in%20the%20philippines&f=false](https://books.google.com.ph/books?hl=en&lr=&id=UGsDFAogOc4C&oi=fnd&pg=PA191&dq=education+status+in+the+philippines&ots=lKI648_vgM&sig=ZmCls0jI1WqccRrnnvWuX_VCzhU&redir_esc=y#v=onepage&q=education%20status%20in%20the%20philippines&f=false)

99. Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education*, 57(4), 2432–2440. <https://doi.org/10.1016/j.compedu.2011.06.008>
100. Tezci, E. (2011). Factors that influence pre-service teachers' ICT usage in education. *European Journal of Teacher Education*, 34(4), 483–499.
101. Toguina, R. (2024). Assessing ICT competence and its impact on academic performance among Bachelor of Elementary Education students. *International Journal for Multidisciplinary Research*, 2(9).
102. Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2018). A multilevel analysis of what matters in the training of pre-service teacher's ICT competencies. *Computers & Education*, 122, 32–42. <https://doi.org/10.1016/j.compedu.2018.03.002>
103. Tribble, D., & PowerSchool. (2025, January 21). The TPACK framework explained (With classroom examples). PowerSchool. <https://www.powerschool.com/blog/the-tpack-framework-explained-with-classroom-examples/>
104. Umar, I. N., & Yusoff, M. T. M. (2014). A study on Malaysian Teachers' Level of ICT Skills and Practices, and its Impact on Teaching and Learning. *Procedia - Social and Behavioral Sciences*, 116, 979–984. <https://doi.org/10.1016/j.sbspro.2014.01.331>
105. UNESCO, (2002). UNESCO Education Report. UNESCO.
106. UNESCO, (2006). UNESCO Progress of Education in the Millennial Era. UNESCO.
107. UNESCO, (2016). UNESCO ICT Competency framework for teachers. UNESCO.
108. UNESCO. (2017). Leveraging Information and Communication Technology to achieve education 2030 (pp. 1–24). <https://unesdoc.unesco.org/ark:/48223/pf0000259587?posInSet=1&queryId=N-EXPLORE-29d24e53-4c19-4469-b679-046cc0d1ee9f>
109. Vicerra, P., Bingcan, J., & Ogena, A. (2012). ICT Competency of Selected Teachers in Two Regions of the Philippines: Employing international standards. <https://library.iated.org/view/VICERRA2012ICT>
110. Villegas, E. M., & Buquia, W. A. (2023). Teachers' competence in information and communications technology. *Polaris Global Journal of Scholarly Research and Trends*, 2(4), 1–13. <https://doi.org/10.58429/pgjsrt.v2n4a93>
111. Vrasidas, C., & McIsaac, M. S. (2001). Integrating technology in teaching and teacher Education: Implications for policy and curriculum reform. *Educational Media International*, 38(2–3), 127–132. <https://doi.org/10.1080/09523980110041944>
112. Wang, X., & Dostál, J. (2017). An analysis of the integration of ICT in education from the perspective of teachers' attitudes. *EDULEARN Proceedings*. <https://doi.org/10.21125/edulearn.2017.0507>

## APPENDIX A

### Letter of Request to Conduct the Study to Abra Valley Colleges



Divine Word College of Bangued  
Bangued, Abra  
Graduate School Department



March 19, 2025

FRANCIS BORGONA, PhD  
School President  
Abra Valley Colleges

Dear Sir!

I am Christopher P. Ramos, a graduate student of the Divine Word College of Bangued. I am currently enrolled in Thesis Writing II and working on my paper entitled "TEACHERS' INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCE AND PERCEPTION TOWARDS EFFECTIVE TEACHING". This study aims to determine the level of ICT competence of the faculty teaching teacher education programs and their perception of integrating ICT towards effective teaching.

In this regard, may I ask your permission and approval to administer my questionnaire among the full-time faculty teaching in the teacher education program in your school?

Rest assured that all personal information gathered will be treated with the utmost confidentiality and will comply with the Data Privacy guidelines and for research purposes only.

Your support for this research undertaking will be greatly appreciated.

Attached is the survey questionnaire for this study. Thank you very much, and may God bless you!

Respectfully yours,  
  
CHRISTOPHER P. RAMOS, LPT  
Graduate School Student

Endorsed:  
  
ELMERITA B. PALARON, PhD  
Dean, Graduate School

Approved by:  
  
FRANCIS BORGONA, PhD  
School President

Received by:  
  
3/24/25

## Appendix B

### Letter of Request to Conduct the Study to Abra State Institute of Sciences and Technology



Divine Word College of Bangued  
Bangued, Abra  
Graduate School Department



March 19, 2025

**DR. GREGORIO T. TURQUEZA JR.**  
President  
Abra State Institute of Sciences and Technology



Thru: **DR. NOEL BEGNALEN**  
Vice-President for Academic Affairs  
Abra State Institute of Sciences and Technology

Dear Sir,

I am Christopher P. Ramos, a graduate student of the Divine Word College of Bangued. I am currently enrolled in Thesis Writing II and working on my paper entitled **"TEACHERS' INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCE AND PERCEPTION TOWARDS EFFECTIVE TEACHING"**. This study aims to determine the level of ICT competence of the faculty teaching teacher education programs and their perception of integrating ICT towards effective teaching.

In this regard, may I ask your permission and approval to administer my questionnaire among the full-time faculty teaching in the teacher education program in your school both in the Main Campus and Bangued Campus?

Rest assured that all personal information gathered will be treated with the utmost confidentiality and will comply with the Data Privacy guidelines and for research purposes only.

Your support for this research undertaking will be greatly appreciated.

Attached is the survey questionnaire for this study. Thank you very much, and may God bless you!

Respectfully yours,

**CHRISTOPHER P. RAMOS, LPT**  
Graduate School Student  
0965-492-5019

Endorsed:

**ELMERITA B. FALCON, PhD**  
Dean, Graduate School

Approved by:

**DR. GREGORIO T. TURQUEZA JR.**  
President

## Appendix C

### Letter of Request to Conduct the Study to Divine Word college of Bangued



Divine Word College of Bangued  
Bangued, Abra  
Graduate School Department



March 19, 2025

**REV. FR. EDGAR L. CALUNOD, SVD, PhD**  
School President  
Divine Word College of Bangued

Thru: **NATIVIDAD T. JORNACION, MALit**  
Program Head of the College of Teacher Education

Dear Father,

I am Christopher P. Ramos, a graduate student of the Divine Word College of Bangued. I am currently enrolled in Thesis Writing II and working on my paper entitled **"TEACHERS' INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCE AND PERCEPTION TOWARDS EFFECTIVE TEACHING"**. This study aims to determine the level of ICT competence of the faculty teaching teacher education programs and their perception of integrating ICT towards effective teaching.

In this regard, may I ask your permission and approval to administer my questionnaire among the full-time faculty teaching in the teacher education program in your school?

Rest assured that all personal information gathered will be treated with the utmost confidentiality and will comply with the Data Privacy guidelines and for research purposes only.

Your support for this research undertaking will be greatly appreciated.

Attached is the survey questionnaire for this study. Thank you very much, and may God bless you!

Respectfully yours,

**CHRISTOPHER P. RAMOS, LPT**  
Graduate School Student

Endorsed:

**ELMERITA B. FALCON, PhD**  
Dean, Graduate School

Approved by:

**REV. FR. EDGAR L. CALUNOD, SVD, PhD**  
School President

## Appendix D

### Cover Letter of the Questionnaire



Divine Word College of Bangued  
Bangued, Abra  
Graduate School Department



March 19, 2025

Dear Respondent,

I am Christopher P. Ramos, a graduate student of the Divine Word College of Bangued. I am currently enrolled in Thesis Writing II and working on my paper entitled **"TEACHERS' INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCE AND PERCEPTION TOWARDS EFFECTIVE TEACHING"**. This study aims to determine the level of ICT competence of the faculty teaching in the teacher education programs and their perception of integrating ICT towards effective teaching.

In this regard, may I ask for your help and cooperation in the said study by objectively answering the attached questionnaire?

Rest assured that all personal information gathered will be treated with the utmost confidentiality and will comply with the Data Privacy guidelines and for research purposes only.

Your support for this research undertaking will be greatly appreciated.

Thank you very much, and may God bless you!

Respectfully yours,



**CHRISTOPHER P. RAMOS, LPT**  
Graduate School Student

Endorsed:



**MAYLENE R. PAMBALAN, PhD, PhDM**  
Adviser

Noted:



**ELMERITA B. PALCON, PhD**  
Dean, Graduate School

## Appendix E

### Data Gathering Instrument



Divine Word College of Bangued  
Bangued, Abra  
Graduate School Department



#### Survey Questionnaire

Teachers' Level of ICT Skills and their Perception of Information and Communication Technology (ICT) Integration in Teaching

#### I. Teacher's Profile

Please put a check mark (✓) in the box that corresponds to your answer about your profile.

- Type of Higher Education Institution  
☐ Private ☐ Public
- Years of Teaching Teacher Education  
☐ 0-3 years ☐ 3.1-6 years ☐ 6.1-10 years ☐ 10.1 years and above
- Generation belongs to  
☐ Baby Boomers (1946-1964)  
☐ Generation X (1965-1980)  
☐ Millennials or Generation Y (born 1980-1994)  
☐ Generation Z (born 1995-2009)  
☐ Generation Alpha (2010-2024)  
☐ Generation Beta (2025-2029)

#### II. Level of Teachers ICT Competence

The following items refer to your ICT competence. Please check the appropriate box that corresponds to the objective assessment of your ICT competence using the scale below.

5 - Strongly Agree 4 - Agree 3 - Neutral 2 - Disagree 1 - Strongly Disagree

|    | STANDARD A. ICT BASICS                                                | 5 | 4 | 3 | 2 | 1 |
|----|-----------------------------------------------------------------------|---|---|---|---|---|
| 1  | Explain the terms Information Technology & Communications Technology  |   |   |   |   |   |
| 2  | Identify the different hardware and software components of a computer |   |   |   |   |   |
| 3  | Differentiate the different types of software                         |   |   |   |   |   |
| 4  | Discuss Networking / Communications Technology                        |   |   |   |   |   |
| 5  | Operate a computer                                                    |   |   |   |   |   |
| 6  | Arrange and customize the desktop                                     |   |   |   |   |   |
| 7  | Manage applications                                                   |   |   |   |   |   |
| 8  | Manage files                                                          |   |   |   |   |   |
| 9  | Manage a printer                                                      |   |   |   |   |   |
| 10 | Troubleshoot the computer                                             |   |   |   |   |   |

## Appendix C

### Data Gathering Instrument (Continued)

| STANDARD B: WORD PROCESSING               |                                                             |  |  |  |  |  |
|-------------------------------------------|-------------------------------------------------------------|--|--|--|--|--|
| 1                                         | Manage documents                                            |  |  |  |  |  |
| 2                                         | Format text                                                 |  |  |  |  |  |
| 3                                         | Format paragraph                                            |  |  |  |  |  |
| 4                                         | Format document                                             |  |  |  |  |  |
| 5                                         | Move and copy text, insert text, delete text                |  |  |  |  |  |
| 6                                         | Insert tables                                               |  |  |  |  |  |
| 7                                         | Insert pictures and images                                  |  |  |  |  |  |
| 8                                         | Preview a document                                          |  |  |  |  |  |
| 9                                         | Print a document                                            |  |  |  |  |  |
| STANDARD C: SPREADSHEET                   |                                                             |  |  |  |  |  |
| 1                                         | Manage workbooks                                            |  |  |  |  |  |
| 2                                         | Select cells, enter data in a cell, insert and delete cells |  |  |  |  |  |
| 3                                         | Handle worksheets                                           |  |  |  |  |  |
| 4                                         | Format data                                                 |  |  |  |  |  |
| 5                                         | Format cells                                                |  |  |  |  |  |
| 6                                         | Format worksheet                                            |  |  |  |  |  |
| 7                                         | Create formulas and functions                               |  |  |  |  |  |
| 8                                         | Create and format charts/graphs                             |  |  |  |  |  |
| 9                                         | Preview a worksheet and print a worksheet                   |  |  |  |  |  |
| STANDARD D: PRESENTATION                  |                                                             |  |  |  |  |  |
| 1                                         | Discuss basic presentation skills                           |  |  |  |  |  |
| 2                                         | Apply appropriate visuals and design considerations         |  |  |  |  |  |
| 3                                         | Manage presentations using a presentation tool              |  |  |  |  |  |
| 4                                         | Create slides                                               |  |  |  |  |  |
| 5                                         | Use different slide views                                   |  |  |  |  |  |
| 6                                         | Apply slide layouts and templates                           |  |  |  |  |  |
| 7                                         | Format text                                                 |  |  |  |  |  |
| 8                                         | Insert pictures and images                                  |  |  |  |  |  |
| 9                                         | Insert drawn objects                                        |  |  |  |  |  |
| 10                                        | Create charts/graphs                                        |  |  |  |  |  |
| 11                                        | Create a slide show                                         |  |  |  |  |  |
| 12                                        | Apply slide show effects                                    |  |  |  |  |  |
| 13                                        | Prepare outputs                                             |  |  |  |  |  |
| 14                                        | Print slides                                                |  |  |  |  |  |
| STANDARD E: INFORMATION AND COMMUNICATION |                                                             |  |  |  |  |  |
| 1                                         | Discuss Internet and World Wide Web                         |  |  |  |  |  |
| 2                                         | Access the Web                                              |  |  |  |  |  |
| 3                                         | Use Bookmarks                                               |  |  |  |  |  |
| 4                                         | Search the Web                                              |  |  |  |  |  |
| 5                                         | Download web pages                                          |  |  |  |  |  |
| 6                                         | Send and receive email                                      |  |  |  |  |  |
| 7                                         | Create an Address Book                                      |  |  |  |  |  |
| 8                                         | Organize messages                                           |  |  |  |  |  |
| 9                                         | Print messages                                              |  |  |  |  |  |

## Appendix C

### Data Gathering Instrument (Continued)

| STANDARD F: COMPUTER ETHICS AND SECURITY |                                                                                                                |  |  |  |  |  |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| 1                                        | Understand personal property and user rights                                                                   |  |  |  |  |  |
| 2                                        | Understand the concept of software piracy and violation of copyright laws                                      |  |  |  |  |  |
| 3                                        | Recognize examples of copyright violations, computer fraud and possible penalties                              |  |  |  |  |  |
| 4                                        | Apply common courtesies and acceptable use policies while telecomputing                                        |  |  |  |  |  |
| 5                                        | Explain the concept of Security                                                                                |  |  |  |  |  |
| 6                                        | Recognize and respond to ethical situations and cyber security issues involving computing devices of all forms |  |  |  |  |  |
| 7                                        | Apply fundamental principles of computer security                                                              |  |  |  |  |  |

#### II. Teacher's Perception of ICT Integration in Teaching

The following statements refers to your perception about ICT integration in teaching. Put a check mark (/) on the column that corresponds to your objective assessment using the legend below.

5 - Always      4 - Frequently      3 - Occasionally      2 - Rarely      1 - Never

| ICT Skills                                                                            | 1 | 2 | 3 | 4 | 5 |
|---------------------------------------------------------------------------------------|---|---|---|---|---|
| 1. I feel confident learning new computer skills.                                     |   |   |   |   |   |
| 2. I find it easier to teach by using ICT                                             |   |   |   |   |   |
| 3. I am aware of the great opportunities that ICT offers for effective teaching       |   |   |   |   |   |
| 4. I think that ICT supported teaching makes learning more effective                  |   |   |   |   |   |
| 5. The use of ICT helps teachers to improve teaching with more updated materials      |   |   |   |   |   |
| 6. I think the use of ICT improves the quality of teaching                            |   |   |   |   |   |
| 7. I think the use of ICT helps to prepare teaching resources and materials           |   |   |   |   |   |
| 8. The use of ICT enables the students' to be more active and engaging in the lesson. |   |   |   |   |   |
| 9. I have more time to cater to students' need if ICT is used in teaching             |   |   |   |   |   |
| 10. I can still have an effective teaching without the use of ICT                     |   |   |   |   |   |
| 11. I think the use of ICT in teaching is a waste of time                             |   |   |   |   |   |
| 12. I am confident that my students learn best without ICT used in teaching           |   |   |   |   |   |
| 13. The classroom management is out of control if ICT is used in teaching             |   |   |   |   |   |
| 14. Students pay less attention when ICT is used in teaching                          |   |   |   |   |   |
| 15. Students make no effort for their lesson if ICT is used in teaching               |   |   |   |   |   |

Sources:  
Regañon (2024)  
Dela Fuente & Biñas (2020)

## Appendix F

### Simple School Description

#### A. Abra State Institute of Sciences and Technology (ASIST) Main Campus (Lagangilang, Abra)

The ASIST Main Campus, located in the municipality of Lagangilang, serves as the primary administrative and academic hub of the institution. Nestled in a sprawling rural landscape, it is known for its focus on agriculture, forestry, and industrial technology. As the historical heart of the college, it provides a conducive environment for research and hands-on technical training, housing the university's central administration and a wide array of specialized laboratories dedicated to the sciences and vocational arts.

#### B. Abra State Institute of Sciences and Technology (ASIST) Bangued Campus (Bangued, Abra)

Situated in the capital town of the province, the ASIST Bangued Campus is the institution's center for urban-based higher education. This campus is strategically located to cater to a large student population and primarily hosts programs in Teacher Education, Arts and Sciences, and Business Administration. Given its proximity to the province's commercial and governmental centers, the Bangued Campus serves as a vital link for community extension programs and professional linkages, providing modern facilities that support the institution's mission of academic excellence and digital modernization in the heart of Abra.

#### C. Abra Valley Colleges (AVC)

Located in the heart of Bangued, Abra Valley Colleges is a pioneering private educational institution known for its long-standing commitment to accessible higher education in the province. As one of the oldest colleges in the region, AVC has built a reputation for producing professionals in the fields of Criminology, Business Administration, and Teacher Education. The campus is characterized by its vibrant student life and its role as a key contributor to the local workforce, focusing on blending traditional academic values with the evolving demands of the modern professional landscape.

#### D. Divine Word College of Bangued (DWCB)

The Divine Word College of Bangued is a premier Catholic higher education institution run by the Society of the Divine Word (SVD). As a catholic school, DWCB integrates academic excellence with spiritual and moral formation, offering a wide range of programs including Teacher Education, Nursing, Business, and Information Technology. The campus is recognized for its disciplined environment and high standards of accreditation.