

Teachers' Information and Communication Technology (ICT) Competencies

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Abstract

ICT use in the classroom is vital for allowing students to learn and apply 21st-century skills. Teachers prepare the learning opportunities that help students enhance the learning process and maximize the students' abilities in active learning. Hence, this research examined the relationship between a teacher's profile and ICT competencies. A quantitative descriptive method was used in this study, and the questionnaire was adopted from the National ICT Competency Standard (NICS) from the Commission on Information and Communication Technology (CICT). The units of analysis of the study were secondary teachers in the West II district of the division of Cagayan de Oro City, Philippines. A total of 148 respondents from the sampling frame were selected using a simple random sampling technique. The data were analyzed through Analysis of Variance. Results showed that out of the demographic variables, age is a factor in the teacher's Information and Communications Technology (ICT) competencies. Overall, the West II District of Cagayan de Oro teachers are competent in the use of ICT technologies as part of their growing grasp in technological operations and concepts, social and ethical, pedagogical and professional development. It is recommended that the school may provide more ICT training which align with the National ICT Competency Standards (NICS) for teachers.

Keywords: Information and Communications Technology, Pedagogical, Professional, Social and Ethical

1. Introduction

Information and Communication Technology (ICT) has become essential to be teaching-learning process. ICT replaces chalkboards with interactive whiteboards, there was also the use of audio-visual or other devices for learning like flipped classroom where the students watch lecture at home with the use of their computer and utilize classroom for more interactive exercises. The implementation of technology also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom environment. The rapid emergence of modern Information and Communication Technologies (ICT) has substantially changed the type of skills that are needed to successfully participate, communicate, and work in a modern society (Gnambs, 2021). When teachers are digitally educated and trained to use ICT, these approaches can promote higher order thinking skills, provide creative ways for students to express their understandings, and leave them better equipped to deal with the rapid technological change that is occurring in both society and the workplace.

In order to successfully work with modern technology-based learning settings, teachers must not only become savvy about ICT but also develop the pedagogical skills required. To help learners acquire the higher-level information acquisition abilities they need to successfully adapt to the knowledge society and new educational techniques must be investigated and created. Nowadays, it appears that teachers' lack of ICT skills significantly hinders their ability to develop innovative and creative computer-supported approaches to learning.

Recent innovations have guided the 21st century's academic study. We can observe various changes in the forms and modes of education are observed. The present-day language pedagogy is leaning towards integrated pedagogy using Information and Communications Technology (ICT). It is a form of learning the use of highly deliberated ICT-integrated instruction. It is a way of interactive knowledge with the excessive use of ICT (Poudel, 2019).

Many technological advancements today complement teachers in their roles such as those of content providers, facilitators of learning, assessors, and reviewers. Thus, in order to improve the quality of their job as teachers, educators are required to be ICT literate. A teacher's competence to effectively use learning for students who have high ICT skills is greatly enhanced by their own knowledge of ICT (Maryuningsih et al., 2019). Teachers are at the core of any living society. Technologies play an essential role in the training program of teachers. The challenge for teachers is to use ICT in ways that boost the students' capacity for active learning. Teachers need to be knowledgeable about and skilled in using new digital tools to ensure that all students meet high academic standards.

Without proper knowledge of ICT, the teachers cannot perform in their classroom, and it could not be said to be complete. The schools are making every effort to address and provide various solutions with regard to these challenges. The use of ICT in the provision and delivery of its educational system, thereby giving the fundamental abilities and knowledge of its teachers. This research study was an effort to assess teacher's profile and ICT competencies to enhance educational quality and using technology competency of teachers in public secondary schools.

Anchored Instruction Theory is the foundation of this research. This theory takes the world's real life as teaching's core content through educational media. Students discover and solve problems in the various means of the natural living world. The "anchor" represents the reality of the living world, and "casting the anchor" is a metaphor for establishing and identifying the natural world to solve difficulties. "Anchored" instruction is one of the critical instructional models under the Constructive Learning Theory. A cognitive and technical team proposed it under the leadership of American professor John Bransford at Vanderbilt University in 1992. The Anchored Instruction Theory emphasizes technology-based learning. Students take technology as the carrier and use the reality of the living world as the main content to discover problems, generate questions, and ultimately solve the problems.

On the other hand, the National ICT Competence Standard (NICS) for Teachers is also a foundation for this study. The NICS, as they are known, is the knowledge and abilities a person needs in particular ICT fields and domains. The NICS aims to support professional development, performance management, and human capital professionalization in business, academia, and government. The competency outcomes and the supporting knowledge and skills are needed to utilize ICT in performing the job roles related to teaching. It provides performance metrics for assessing a teacher's expertise and understanding of using ICT in the classroom.

In principle, the NICS set of competencies strives to equip teachers to use a variety of ICTs so that they can benefit from the technology and their students. The prime benefits are 1) access to information and knowledge resources, 2) communication and knowledge sharing, and 3) work efficiency. Based on extensive comparative analysis of current business methods in other nations, the NICS-Teachers was created in conjunction with several public and private organizations institutions and stakeholders. Knowledge and skills in competency areas are presented generally with specifics on essential areas of learning but avoid reference to specific vendors, versions, or equipment. Thus, it allows flexibility in adopting the standard while preserving the general requirements for competence.

ICT can empower people with opportunities and choices for grammar exercises and activities. Technology is a way in which people use the ideas of science to make their tasks easier, faster, and more available. Relative to this, Lux et al. (2017) expressed that introducing new curricula based on real-world problems brought by technology has provided scaffolding and tools to enhance learning, thus resulting in the unprecedented transformation of schools and classrooms. ICT is a catalyst that offers multidimensional ways

of facilitating communication and interaction between teachers and students.

Information technologies have proven to be beneficial to learners. Integrating ICTs has become both slogan and a selection in developed and developing countries. The study explored teachers' perceptions of ICT integration in instructional processes at the secondary school level.

2. Methodology

This research was a quantitative descriptive study using survey methods (Bahasoan et al., 2020) to fulfill the goals outlined in this study. In addition, this study was a non-experimental type of research whereby the variables were measured using numerical terms although the variables under interrogation were not manipulated by the researcher. A sufficient and accurate interpretation of the findings was necessary for a study that used the descriptive method of research. It was designed to collect data for the simple purpose of describing the character of the subject matter. The descriptive-survey research provided an opportunity for the researcher to investigate thoroughly and gathered detailed information about the respondents' profile and ICT competencies, allowed the researcher to learn more about the current state of the phenomena being studied. The method involved description, recording, analysis, and interpretation of the interplay of the variables of this study.

The following statistical tools had been employed to facilitate the analysis and interpretation: Descriptive statistics such as frequency and percentage for problem 1. For problem 2, mean and standard deviation were used. Analysis of Variance or ANOVA was employed to determine the significant relationship between ICT competency in terms of age, gender, designation, and teacher's training on ICT.

3. Results and Discussion

Problem 1. What is the teachers' demographic profile in terms of:

- 1.1 Age;
- 1.2 Sex;
- 1.3 Designation; and
- 1.4 Teacher's training on ICT?

Table 1 shows the teachers' demographic profile in terms of age, sex, designation, and teacher's training on ICT. It reveals that 40% of the teachers are 35-44 years old. Only 3% are 24 years old and below. This means that there are more older teachers than younger ones in West II District. It could be that there were less or no hiring of new teachers in this district as the reason of having less younger teachers in this district. It might also be that teachers who are aged 35-44 have time and active in responding the requested call or activity/ies in school. However, it stated that age can be both favorable as well as adverse as presented in relation to teaching (Shah & Udgaonkar, 2018). The age advanced the teachers become experienced.

With regards to the teachers' demographic profile in terms of Sex, it shows that there are more female teachers than male teachers. Out of 148 respondents, 102 are females and only 46 are males. This means that there is unequal number of teaching personnel in terms of sex. According to Philippine Statistics Authority 2021 in the entire country 54 % are females and 46 % males in the teaching field. This result reflects the situation of the country. This implies that in the field of teaching, female dominated. Teaching is a motherly work as Sudhakar (2017) quoted that "The Best Teacher sees her students as a continuum of oneself; she is someone who has personified. There are times when mannerism match her personality more than their own mothers, treat her students like her own children and watches out for them, making sure they always do their best". This implies that teaching is a motherly act which is better to have female teachers.

Further, pertaining to the teachers' demographic profile in terms of Designation, it displays that 72% of the respondents are Teacher I and 4% in the position of a Master Teacher I. This means that majority of the

teachers are in Teacher I position. This confirmed to the statistics of DepEd Data Bits: Public School Teachers school year 2020-2021 that 92% are in the designation of Teachers and 7% are Master Teachers in the Philippines. This implies that there are teachers who are not interested in the promotion. One of the reasons is that the teachers' requirements adhering to the stipulated guidelines in Philippine Professional Standards for Teachers (PPST) for the selection and promotion of teachers are hard to accumulate and file. As Alegado (2018) claimed that teachers in public schools are classified into different teaching positions, such as teacher, master teachers, head teachers, and special education teachers. In which everyone contributed to the teaching-learning process. The responsibilities, duties, and educational requirements of the positions are based on personal qualifications. This classification scheme was implemented to support and compensate initiatives for teachers pursuing professional growth. Besides only one (1) Master Teacher in every ten (10) teachers as the ratio for the Master Teacher position.

Table 1
Teachers' Demographic Profile

Demographic Profile	n	%
Age		
24 and below	5	3
25 - 34	35	24
35 - 44	59	40
45 - 54	36	24
55 - 64	13	9
Sex		
Male	46	31
Female	102	69
Designation		
Teacher I	106	72
Teacher II	11	7
Teacher III	24	16
Master Teacher I	6	4
Master Teacher II	1	1
Teachers Training on ICT		
None	27	18
1 - 2	70	47
3 - 4	29	20
5 - 6	7	5
7 - 8	2	1
9 and above	13	9

Note: N = 148 respondents

Meanwhile, on teachers' demographic profile in terms of Teachers' Training on ICT, it presents that 47% of the respondents had experienced once or twice training on Information and Communication Technology (ICT), while 5% of them had 5 to 6 years experienced the ICT training as shown in Table 1. It indicates that ICT training for teachers is very limited in the Philippines. The teachers who have a higher designation need more training on ICT as Kamaruddin et al. (2017) said that most seasoned teachers needed to gain awareness of ICT applications for education. Although the Department of Education (DepEd) conducted webinars on ICT-based teaching strategies during the COVID pandemic, however some teachers were not able to attend due to availability of the internet connection especially those teachers who were assigned in the far-flung areas.

Problem 2. What is the teachers' level of ICT competency in terms of:
2.1 Technological Operations and Concepts;

- 2.2 Social and Ethical;
 2.3 Pedagogical;
 2.4 Professional?

Table 2*Teachers' ICT Competency in Terms of Technological Operations and Concepts*

Indicators	Mean Score	Description	Interpretation
1. Identify and define the functions of the main components (i.e. monitor, system unit, keyboard, mouse) of the computer.	3.14	Experienced	Competent but would benefit from further training and development
2. Organize and manage computer files, folders, and directories.	3.18	Experienced	Competent but would benefit from further training and development
3. Use storage devices (i.e. hard disk, diskette, CD, flash memory, etc.) for storing and sharing computer files. Create back-ups and important files.	3.05	Experienced	Competent but would benefit from further training and development
4. Use word processors to enter and edit text and images.	3.13	Experienced	Competent but would benefit from further training and development
5. Format text, control margins, layout and tables.	3.15	Experienced	Competent but would benefit from further training and development
6. Use a calculation spreadsheet to enter data, sort data and format cells into tables.	2.96	Experienced	Competent but would benefit from further training and development
7. Make computations, use formulas, and create graphs using spreadsheets.	2.79	Experienced	Competent but would benefit from further training and development
8. Download and install relevant applications using freeware, shareware, updates, patches, viewers, and support applications.	2.86	Experienced	Competent but would benefit from further training and development
9. Effectively use search engines, directories, crawlers, and agents to locate information sources.	2.81	Experienced	Competent but would benefit from further training and development
10. Properly acknowledge information sources – online and offline.	2.90	Experienced	Competent but would benefit from further training and development
Total	2.99	Experienced	Competent but would benefit from further training and development

Note: 3.26-4.00 Very Competent; 2.51-3.25 Competent; 1.76-2.50 Fairly Competent; 1.00-1.75 Lacking Competence

Table 2 shows the level of ICT competence in terms of Technological Operations and Concepts. It has an overall Mean of 2.99 which is described as Experienced and it is interpreted as the teachers are competent but would benefit from further training and development. The result shows that most of the respondents are experienced in organizing and managing computer files, folders, and directories. This means that these teachers are competent. It indicates that the teachers are knowledgeable about handling computers. However, they appreciate to be invited for a training for enhancement of their ICT skills. This supports the study of Samonte and De Guzman (2019), that teachers have advanced knowledge in demonstrating knowledge and skills in essential computer operation and other information devices. As with any filing system, it is important to organize the files so they can be quickly accessible when needed. In fact, the way teachers organize the files on a computer can have a direct effect on how efficiently they are in the classroom.

Moreover, the indicator, Organize and manage computer files, folders, and directories, has the Highest Mean of 3.18 which is described as Experienced and interpreted as the teachers are competent but would benefit from further training and development. This means that teachers know the basic but important skill in using the computer. That everything they do on the computer, if it needs to be saved, teachers know how to do it. However, there are more things that computer can do that teachers still need training to improve their skills.

Nonetheless, the indicator, Make computation, use formulas, and create graphs using spreadsheets, has the Lowest Mean of 2.79 but still described as Experienced and interpreted as the teachers are competent but would benefit from further training and development. The indicator mentioned is hard to do by the

teachers. It cannot be learned in one setting. It needs training and constant practice. To accomplish these actions, more knowledge is required. An instructive finding emerging from this work is the need for reliable and efficient support systems in schools to facilitate teachers' efforts in using ICT-based instructional technologies in teaching and learning (Sharma & Sharma, 2017).

Table 3
Teachers' ICT Competency in Terms of Social and Ethical

Indicators	Mean Score	Description	Interpretation
1. Understand the legal implications of Software Licenses and Fair Use.	2.62	Experienced	Competent but would benefit from further training and development
2. Understand and explain the basic concepts of Intellectual Property Rights	2.70	Experienced	Competent but would benefit from further training and development
3. Detecting plagiarism in student work.	2.52	Experienced	Competent but would benefit from further training and development
4. Properly acknowledge sources used in own work.	2.71	Experienced	Competent but would benefit from further training and development
5. Show respect for privacy and cyber etiquette, phone etiquette, and similar use of technology	2.96	Experienced	Competent but would benefit from further training and development
6. Demonstrate proper handling of computer devices and use of applications	2.83	Experienced	Competent but would benefit from further training and development
7. Promote and implement rules and regulations on proper usage of computers.	2.82	Experienced	Competent but would benefit from further training and development
8. Design class activities to minimize the effect on students being disadvantaged or left-out.	2.72	Experienced	Competent but would benefit from further training and development
9. Prepare lessons and activities appropriate to the level of learning and cultural background of the students.	2.82	Experienced	Competent but would benefit from further training and development
10. Adapt activities using specialized hardware and software for physically disadvantaged students.	2.59	Experienced	Competent but would benefit from further training and development
TOTAL	2.73	Experienced	Competent but would benefit from further training and development

Note: 3.26-4.00 Very Competent; 2.51-3.25 Competent; 1.76-2.50 Fairly Competent; 1.00-1.75 Lacking Competence

Table 3 on the next page, displays the level of ICT competence in terms of Social and Ethical. It has an overall Mean of 2.73 which is described as Experienced and interpreted as the teachers are competent but would benefit from further training and development. This means that teachers know the social and ethical standards while using computers online, but they still appreciate to watch or hear additional trainings to get updated with social and ethical standards because it is believed that teachers do not bother to stay for long over the computer.

Moreover, the indicator, show respect for privacy and cyber etiquette, phone etiquette, and similar use of technology has the Highest Mean of 2.96 which is described Experienced and interpreted as the teachers are competent but would benefit from further training and development. This means that the teachers are able to display consideration for others' privacy and good manners when using phones, computers, and other devices. It implies that the majority of the teachers demonstrate respect for privacy and phone etiquette, cyber, and other technological manners.

However, Detecting plagiarism in student work, scored the lowest (2.52) but still described as Experienced and interpreted as the teachers are competent but would benefit from further training and development. It is important that teachers can detect plagiarism in students' work because plagiarism is a form of theft and it has serious consequences. The standard states that "teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices". It focuses on advocating, addressing, promoting, and developing social and ethical ICT responsibility. Marcial, (2017) suggested that there is a need to improve ICT social and ethical

competencies among teacher educators.

Augmenting these competencies must be a concerted effort among administrators, faculty members, schools, government, and other stakeholders. To successfully address the related social and ethical challenges, the governance system needs a greater knowledge of the effects of digitalization. Such comprehension is essential for proactive problem solving, which entails anticipating, thinking about, deliberating with the public and other stakeholders, and taking action (Stahl et al., 2017).

Table 4
Teachers' ICT Competency in Terms of Pedagogical

Indicators	Mean Score	Description	Interpretation
1. Make students use databases, spreadsheets, concept mapping tools, and communication tools, etc.	2.52	Experienced	Competent but would benefit from further training and development
2. Use appropriately slide presentations, videos, audio, and other media in the classroom.	2.88	Experienced	Competent but would benefit from further training and development
3. Teach students to use various multimedia materials for the reports and class presentations.	2.73	Experienced	Competent but would benefit from further training and development
4. Use various synchronous and asynchronous communication tools (email, chat, whiteboards, forum, blogs)	2.70	Experienced	Competent but would benefit from further training and development
5. Design rubrics for assessing student performance in the use of various technologies.	2.71	Experienced	Competent but would benefit from further training and development
6. Use of electronic means of administering quizzes and examinations.	2.63	Experienced	Competent but would benefit from further training and development
7. Analyze assessment data using spreadsheet and statistical applications.	2.49	Developing	Fairly competent and need further training and development
8. Use emails, group sites, blogs, etc. for disseminating information directly to students, colleagues, and parents.	2.66	Experienced	Competent but would benefit from further training and development
9. Explore the use of electronic assessment tools like online testing, submission of projects via email or online facilities.	2.66	Experienced	Competent but would benefit from further training and development
10. Set up online databases or repositories of student works.	2.48	Developing	Fairly competent and need further training and development
TOTAL	2.64	Experienced	Competent but would benefit from further training and development

Note: 3.26-4.00 Very Competent; 2.51-3.25 Competent; 1.76-2.50 Fairly Competent; 1.00-1.75 Lacking Competence

Table 4 displays the level of ICT competency in terms of pedagogical. The overall Mean of the ICT competency in terms of pedagogical is 2.64 which is described as Experienced which interpreted that the teachers are competent but would benefit from further training and development. The findings show that most respondents were able to appropriately use slide presentations, videos, audio, and other media in the classroom which scored 2.88 which is rated as Experienced. It indicates that most teachers now practice using slide presentations or PowerPoint with video and audio. Slide presentation can be an effective tool to present material in the classroom and encourage student learning.

On the other hand, setting up online databases or repositories of student works, scored the lowest (2.48) which is described as Developing and interpreted as teachers are fairly competent and needed further training and development on this skill. The data repository is a large database infrastructure that collects, manages, and stores data sets for data analysis, sharing and reporting. Awareness of the learning metaphors can inspire introspection and reflection that draws attention to the importance of the participation metaphor, whose prevalence is currently relatively low.

Moreover, this awareness will encourage greater sensitivity to a duality of acquisition metaphor, which expresses the use of ICT tools to enhance teacher-centered pedagogy and promote student-centered learning (Blau et al., 2018). Relative to what From (2017) posited that it is a knowledge of ICT-support which is relevant and important. A knowledge of digital technologies can support the operationalization of pedagogical ideas in a given context. However, the use of ICT in pedagogy is not directly impacted by

technological pedagogical content knowledge that is mediated by teachers' effectiveness but is instead impacted by creative organizational atmosphere that is mediated by teachers' effectiveness (Andyani et al., 2020).

Table 5
Teachers' ICT Competency in Terms of Professional

Indicators	Mean Score	Description	Interpretation
1. Identify educational sites and portals suitable to their subject area.	2.71	Experienced	Competent but would benefit from further training and development
2. Join online communities, subscribe to relevant mailing lists and online journals.	2.66	Experienced	Competent but would benefit from further training and development
3. Review new and existing software for education.	2.47	Developing	Fairly competent and need further training and development
4. Recommend useful and credible websites to colleagues.	2.55	Experienced	Competent but would benefit from further training and development
5. Conduct research on the use of technology in the classroom.	2.55	Experienced	Competent but would benefit from further training and development
6. Follow online tutorials or online degree programs.	2.68	Experienced	Competent but would benefit from further training and development
7. Actively participate in online forums and discussions.	2.66	Experienced	Competent but would benefit from further training and development
8. Publish (formal/informal) research on the use of ICT in education	2.40	Developing	Fairly competent and need further training and development
9. Share lesson plans, worksheets, templates, and teaching materials through course websites.	2.63	Experienced	Competent but would benefit from further training and development
TOTAL	2.59	Experienced	Competent but would benefit from further training and development

Note: 3.26-4.00 Very Competent; 2.51-3.25 Competent; 1.76-2.50 Fairly Competent; 1.00-1.75 Lacking Competence

Table 5 on the next page, shows the level of ICT competency in terms of professional. The overall mean is 2.59 which is described as Experienced and interpreted as the teachers are competent but would benefit from further training and development. This means that teachers can be considered as professionals or professionally competent. Because they know how to manipulate according to their needs. They know how to browse the internet, locate sites and portals for their learning modules, fact sheets, worksheets and other instructional materials. They join communities, they have emails, social sites. They join webinars, they know how to operate the websites they need as teachers. Through their continuous use of ICT, they can maximize their learning as told by (Syahid et al., 2019).

The indicator, identify educational sites and portals suitable to their subject area, has the highest mean of 2.71 which is described as experienced and interpreted as development. This means that most teachers can locate educational portals and websites relevant to the subject of interest. In line with the study of Li et al. (2019) stated that an effective professional development is teachers' learning new ICT-related practices and abilities. ICT skills come in many different forms, which are listed in the digital competency framework which include technology-assisted communication, information literacy, and the capacity to solve issues in digital surroundings.

On the other hand, the indicator number 5, Publish (formal/informal) research on the use of ICT in education, has the lowest Mean of 2.40 which is described as Developing and interpreted as the teachers are fairly competent and need further training and development. It means that teachers are not able to publish studies on the application of ICT in education, both formal and informal. It indicates that many of the respondents are not doing any research yet. One of the reasons is that it is not mandated in the Department of Education although teachers are encouraged to engage in research. Relative to the study of Luu et al. (2017), they expressed that many teachers are required to complete a great amount of workload in the school without

getting any additional assistance from the school for extra time for research. Some factors can come from the teachers themselves, such as their awareness, beliefs, skills, and knowledge, as well as from outside sources, like the non-collaborative school culture, limited resources, financial concerns, and other demotivators.

Table 6*Teachers' Overall ICT Competency of Teachers*

Competency	Mean Score	Description	Interpretation
1. Technological Operations and Concept	2.99	Experienced	Competent but would benefit from further training and development
2. Social and Ethical	2.73	Experienced	Competent but would benefit from further training and development
3. Pedagogical	2.64	Experienced	Competent but would benefit from further training and development
4. Professional	2.59	Experienced	Competent but would benefit from further training and development
TOTAL	2.74	Experienced	Competent but would benefit from further training and development

Note: 3.26-4.00 Very Competent; 2.51-3.25 Competent; 1.76-2.50 Fairly Competent; 1.00-1.75 Lacking Competence

Table 6 displays the Level of ICT Competency of Teachers. It has an overall mean of 2.74 which is described as experienced and interpreted as teachers as competent but would benefit for further training and development. This result is somewhat higher than the study conducted in 2018 by the Southeast Asian Ministers of Education Organization Regional Center for Educational Innovation and Technology (SEAMEO INNOTECH). In this study, they found out that many Filipino teachers need more ICT competencies and training 87% of them had the basic knowledge of computer applications, but only 33% had advanced knowledge. This implies that teachers now have improved in their ICT literacy. They are already good for it.

The table also shows that the ICT competency of Technological Operations and Concepts scored the most (2.99). This competency includes the essential parts of a computer and the basic operation of Microsoft Office, again similar results to the study conducted by SEAMEO. This implies that most of the respondents were able to identify and can manipulate technical operations and concept, and productivity of various ICT tools like computers and communication devices as well as applications available online or offline.

However, the ICT competency of Professional scored the least, 2.59 but still rated as Experienced which means that the respondents are competent but would benefit from further training and development. This finding requires teachers to improve more on professional growth and development, attain on research innovation and collaboration. In parallel with the study of Flores et al. (2017) it claimed that time should be allocated for teacher collaboration, the shared reflection on experiences regarding the use of ICT in teaching and learning, and the joint assessment, selection, and adaptation of digital learning resources. In addition, continuous practice and habituation of ICT utilization in learning will bring about a change and maximize the benefits of ICT for learning (Syahid et al., 2019).

Problem 3. Is there a significant difference between ICT competency and when grouped in terms of:

- 3.1 Age;
- 3.2 Sex;
- 3.3 Designation; and
- 3.4 Teacher's training on ICT?

Table 7 shows the difference between age and ICT competency. A one-factor analysis of variance has shown that there is a significant difference between the categorical variable and the dependent variable $F = 10.86$, $p = <.001$. Thus, with the available data, the null hypothesis is rejected. It means that there is a significant difference between ICT competency and when grouped in terms of age. This indicates that among demographic variables, a teacher's age affects their ICT competence.

Table 7

Difference between Age and ICT Competency

Age	M	SD	Variance	
24 and below ^a	3.78	0.33	0.11	F stat > Fcrit
25 - 34 ^b	3.01	0.60	0.36	10.86 > 2.44
35 - 44 ^c	2.80	0.63	0.40	
45 - 54 ^d	2.40	0.56	0.31	*Significant
55 - 64 ^e	2.31	0.38	0.15	

The Bonferroni post-hoc test revealed that the pairwise group comparisons of a - c, a - d, a - e, b - d, b - e and c - d have a p-value less than 0.05 and thus, based on the available data, it can be assumed that these groups are each significantly different pairwise. This implies that the teachers aged 34 and below are significantly higher than any age group, teachers belonging to these groups can benefit from higher ICT seminars, while those aged 45 and up may benefit from basic and more frequent ICT seminars. It also corresponds to the study of Hautala et al. (2017) the digital gap is especially noticeable among those aged over 65 years.

With the development of technology the older teachers had difficulty in utilization ICT in the classroom (Gamboa 2022). The results of this study is in contrast with the study of Kerzic et al. (2021) it claimed that there are no age differences in their instructional use and a few in their personal ICT use. However, the result shows similar to the study of Califf and Brooks (2020) stated that there is a significant positive relationship between teacher's age and their level of technological concern. The results further implies that the younger the teacher the more competence it displayed. In parallel with the study of Torres et al. (2020) in their research revealed that young teachers with some teaching experience had positive perceptions of technology.

Table 8

Difference between Sex and ICT Competency

	N	Mean	Std. Deviation	T	P	Std. Error Mean
female	102	2.68	0.63	1.78	.077	0.06
male	46	2.88	0.69			0.1

Table 8 shows the difference between sex and ICT competency. A two-tailed t-test for independent samples (equal variances assumed) showed that the difference between female and male with respect to the dependent variable was not statistically significant, $t(146) = -1.78$, $p = .077$, 95% confidence interval $[-0.43, 0.02]$. Thus, the null hypothesis is retained. It means that there is no significant difference between ICT competency and when grouped in terms of sex.

Since, the null hypothesis is retained, it indicates that teacher's sex does not affect and ICT competency. As presented in Table 8 the perceived ICT competency mean of the males ($M=2.88$) is higher than that of the females ($M=2.68$), however, this difference is not substantial enough to draw the conclusion that men believe they are more skilled ICT competent than women. Both male and female are equally considered and address the connectivity challenges and needs for all groups in society, and takes into particular consideration the unique challenges faced by women when it comes to accessing and using the internet. The results aligned with the study of Čekse et al. (2018) showed that gender differences are not significant in terms of the pedagogical use of ICT. Likewise, men overestimated their ICT performance more strongly than women, although this difference was similar, according to Gnambs (2021). Men and women were generally more similar than different in their abilities to deal with digital information and the challenges of a technology society since the observed gender gaps in ICT literacy were very low. In contrast with the study of Punter et al. (2017) on gender differences in Computer and Information Literacy and the dimensionality of the construct, the findings shed new light on girls, and women often assumed a disadvantaged position in today's information society.

Table 9
Difference between Designation and ICT Competence

	Sum of Squares	df	Mean Squares	F	P	Critical F-Value
Between Groups	2.35	3	0.78	1.89	.134	2.67
Within Groups	59.26	143	0.41			
Total	61.62	146				

Table 9 demonstrates the difference between designation and ICT Competence. A one-factor analysis of variance has shown that there is no significant difference between the categorical variable and the dependent variable $F = 1.89$, $p = .134$. Thus, with the available data, the null hypothesis is not rejected. This means that there is no significant difference between ICT competency and when grouped in terms of designation.

As presented in Table 9, in this data the variability is too high that caused the null hypothesis to be true. Hence, a teacher's designation or the job position is not associated with ICT technological competence. In accordance with the study of Muhammad et al. (2020) showed that teachers with certificate in education have a higher percentage against those with Bachelors' degree. It was found that teachers with master's degree have less representation. Findings display the fact that teachers' level of knowledge and skill is still at its lowest which reduced intellectual colleague contacts, and possible exposure to modern techniques of classroom instructions. However, traditional teacher skills and practices are still relevant despite the fact that the job of a teacher using ICTs has changed from a position of command to that of a facilitator. Regardless of their teaching job, having instructors see themselves as science learners with crucial traits like curiosity, intellectual rigor, and confidence could be useful for their development (Nixon et al., 2017).

Table 10
Difference between Teachers' Training and ICT Competency

	Sum of Squares	df	Mean Squares	F	p	Critical F-Value
Between Groups	2.11	5	0.42	0.98	.433	2.28
Within Groups	61.11	142	0.43			
Total	63.21	147				

Table 10 shows the difference between teacher's training and ICT competency. A one-factor analysis of variance has shown that there is no significant difference between the categorical variable and the dependent variable $F = 0.98$, $p = .433$. Thus, with the available data, the null hypothesis is not rejected. Since the null hypothesis is accepted, it is perceived that there is no significant difference between ICT competency and when grouped in terms of teacher's training on ICT.

This indicates that regardless the number of training on ICT that the teachers have attended it may not be affected on the ICT competency. The data implies that there is a substantial variability which confirmed the null hypothesis. The results of this study contradicted to Macion (2021), it stressed-out that the technological competence of the ICT trained teachers is very good but fair on integration and technological understanding. Likewise, in the study of Palomino (2017) results showed that there were noticeable differences in the "Professional teacher development in ICT" aspect. In order to improve training through curricular revisions and the adaptation of the teaching-learning process to higher education students, this has helped identify the attitudes of the teachers and their teaching needs in the area of ICT. Additionally emphasized are ICT's usefulness in education and its perceived importance for teaching (Gudmundsdottir & Hatlevik 2018). It has been demonstrated how difficult it is to incorporate ICT into the classroom. As a result, they underlined how important it is for teachers to have ICT skills in order for them to effectively use these instructional materials. Therefore, ICT training for educators is essential for obtaining the right programs, and these themes must be included in teacher training plans.

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