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Research Article

Information and Communication Technology (ICT) Knowledge, Skills, and Attitude: Basis for DEPED Support System

John L. Paciente*
For affiliations and correspondence, see the last page.

Abstract

This descriptive study determine the teachers' ICT knowledge, skills, and attitude as basis for support system in the Schools Division of Iloilo for the School Year 2020-2021. The respondents of the study were the public secondary school teachers and they classified according to age, sex, civil status, educational attainment, and length of service. The statistical tools used were the frequency count, percentage, mean, Mann-Whitney U-test, Kruskal Wallis H-test, and Spearman's rho with the aid of computers' Statistical Package for Social Sciences Software (SPSS) software. It found out that the level of teachers' knowledge and skills on ICT were very high and had a very favorable attitude. In addition, there were significant differences existed in the level of ICT knowledge in sex, civil status, and educational attainment while no significant differences on age and length of service. That there were significant differences in the level of ICT teachers' skills when classified according to sex and length of service while no significant differences existed on age, civil status, and educational attainment. Moreover, there were significant differences in teachers' attitude on ICT when classified into sex and educational attainment while no significant difference existed on age, civil status and length of service. Lastly, there was significant relationships between skills and attitude among ICT teachers, no significant relationship existed between teachers' knowledge and skills and between knowledge and attitude on ICT.

Keywords: Knowledge, Skills, Attitudes, Information and Communication Technology(ICT)

Introduction

In the absence of certainty regarding the next steps for K-12 schools as the COVID, 19 pandemics have undoubtedly affected school administrators, and teachers are apprehensive about their schools' futures. They look at different solutions that would undoubtedly help them continue learning and help educators guide their students through this challenging time.

The Department's response to the challenges mandates that education must continue whatever the changes and dangers we confront now and in the future. Thus, the Deped Order 12 series of 2020, the Adoption of Basic Education Learning Continuity Plan in the time of COVID-19 (BE-LCP), by its very name and as instituted by law, mandate the Department of Education (DepEd) to ensure access to and provide primary education for all learners at all times. For this reason, it enhances online learning and teaching measures and other alternative modes of education delivery by protecting the health and safety of learners, teachers, non-teaching personnel, and its school structures.

As an ICT teacher for a long time already, the researcher observed that many teachers lacked ICT knowledge, skills, and attitude. Moreover, they should indeed be given technical assistance by the school heads and other IT experts to perform what is expected. Thus, this study was conducted.

Research Questions

This study aimed to determine the teachers' Information and Communication Technology (ICT) knowledge, skills, and attitude as the basis for a support system in the Schools Division of Iloilo, the Philippines for the school year 2020- 2021.

1. Are there significant differences in the level of ICT knowledge of teachers when classified according to age, sex, civil status, educational attainment, and length of service?
2. Are there significant differences in level of ICT skills of teachers when classified according to age, sex, civil status, educational attainment, and length of service?
3. Are there significant differences in teachers' ICT attitude when classified according to age, sex, civil status, educational attainment, and length of service?
4. Are there significant relationships among the ICT knowledge, skills and attitude of teachers?

Literature Review

On ICT Knowledge of Teachers

Familiarize the teachers with computer hardware and software hence reducing the need for computer technicians in schools. There is a need to provide computers to teachers so that they can easily access materials and prepare for technology integration. Although most of the teachers had basic computer literacy, there was a challenge in technology integration due to inadequate pedagogical knowledge on integration. Teachers implementing the new curriculum should be involved in frequent PD programs and training that goes beyond basic computer literacy to technology integration in various subjects. In circumstances where the shortage of devices is inevitable, teachers should be trained on how to encourage collaboration among learners through the sharing of the technology devices and working on tasks as a team. Murithi and Yoo (2021) further indicated that teachers have a high attitude towards the use of ICT regardless of gender and the numerous challenges that they face. To encourage the younger teachers to use technology and to train their older colleagues on integration in teaching, the government should consider giving incentives. A reward such as official recognition or sponsorship for further ICT in education training could act as a good motivator to younger teachers.

According to Peterrson (2018), teachers' ICT competencies include, for example, using ICT to communicate with students, their parents, and other stakeholders; to improve communication strategies; to work with colleagues; to share and exchange knowledge and experience; and also for their professional development. Teachers should be able to organize digital content and make it accessible to students, include ICT in teaching, and use it to support and develop students' cooperation. Recall that there is a very interesting theoretical framework related to theories of acceptance of ICT in teaching (Taherdoost, 2018).

The framework of teachers´ digital competencies that shows what today's teachers should understand and be able to do. Currently, digital competencies of teachers (DigCompEdu), which is a part of the activities related to the action plan for digital education, which was preceded by a number of other related activities. Their common goal was and is to strengthen digital competencies in teachers. These are common strategies of education and various training policies to the development of the education system, evident in the slower implementation of ICT in education, but also in the further education of teachers, who still focus more on language courses that were not so accessible to them before and ICT courses are at the edge of their attention (Habibov, 2019).

Many teachers rely only on self-study, the effectiveness of which fails due to the time demands of the teaching profession, resulting not only from teaching but also from preparing the classes, performing a number of administrative tasks that teachers have to deal with daily, working with the class and parents of students, and further due to the lack of motivation and support. Ineffective self- study and the lack of concepts of further education in ICT thus widen the gap in the level of digital competencies of teachers in different countries, but also the gap between the digital competencies of teachers and students educated by these teachers. To reduce concerns about unexpected problems in the use of ICT in teaching, it is essential to pay attention to further education in ICT. Based on the results of Scandurra and Calero (2020), teachers' further education is critical in terms of its effect on both teachers´ and their students´ labor market outcomes and skills. The link between teachers´ education and their competencies used in the workplace reflects the effect of the level of further education on the daily use of skills in the labor market. Therefore, the sufficient development of ICT competencies gives both teachers and their students an advantage in the labor market and also helps them achieve professional goals in their workplace. Studies have also noticed that differences in historical and institutional evolution, family, cultural, and social capital are relevant in explaining the development and levels of education and competencies and vary based on the way how countries deal with unequal life chances of individuals participating in education (Almerich et. al., 2016).

In general, observed several important specifics from various comparative research studies of ICT knowledge. It should be noted that the intellectual skills of teachers are no worse than average in an international comparison (Kjellsdotter, 2020).

On ICT Skills of Teachers

In reviewing several 21st Century Skills frameworks, it point out that all examined frameworks highlight the intersection between ICT and 21st Century Skills. Firstly, they offer a comparison between the various elements that ICT and information literacy encompass through these frameworks, including as means of

communication and collaboration, and as providing the capacity to access information efficiently and effectively. Secondly, they highlight that the use of ICTs to this end requires the ability to evaluate information critically and competently, and to use information accurately and creatively (Jones et al., 2019).

Finally, it suggest that ICT holds the promise of supporting the acquisition and assessment of 21st Century Skills, thereby recognizing the importance of ICT as a tool for the development of 21st Century Skills in the individual. Van Laar et al.'s (2017) systematic literature review on the relation between 21st Century Skills and digital skills and/or literacy identifies a number of areas of crossover. While the results of their review show that the attributes associated with 21st Century Skills are generally broader than those associated with digital skills, digital skills and/or literacy, cover a number of attributes also strongly associated with 21st Century Skills. These include information management; collaboration; communication and sharing; creation of content and knowledge; ethics and responsibility; evaluation and problem-solving; and technical operations Van Laar et al., 2017). However, they also conclude that while digital skills are necessarily underpinned with ICT knowledge, this is not necessarily the case with 21st Century Skills. Although 21st Century Skills and digital skills are both seen by commentators as crucial attributes, and while there is some significant conceptual crossover between the two, Van Laar et al. (2017) conclude that the combination is not yet sufficiently defined. In this light, they introduce the concept of '21st century digital skills', defined as: (1) the mastery of ICT applications to solve cognitive tasks at work; (2) skills that are not technology-driven, as they do not refer to the use of any particular software program; (3) skills that support higher-order thinking processes; and (4) skills related to cognitive processes favouring employees' continuous learning. Detailed conceptual definitions of '21st century digital skills' including operational components are also provided. They present such skills as critical for both people and organisations for keeping up with developments and innovating products and processes. Lewin and McNicol (2015) also examine the relation between ICT and 21st Century Skills and conclude that ICT is at the core of the majority of 21st Century Skills frameworks. While some frameworks emphasise ICT-related competences as separate domains, others call attention to more integrative approaches where the development of ICT skills is embedded within other 21st century competences, such as critical thinking, problem solving, communication and collaboration.

When defining ICT-related competences in the context of 21st Century Skills, most frameworks reference three types of literacies, Information literacy, the capacity to access information efficiently and effectively, to evaluate information critically and competently, and to use information accurately and creatively. The ICT literacy focuses mainly on how to make an effective and efficient use of digital technologies. The main difference between ICT literacy and technological literacy lies in their emphasis with regard to the competences needed to function in a knowledge society. Technological literacy emphasises the interplay between technology and society, as well as the importance of understanding the technological principles needed to solve complex problems and face the challenges of a knowledge society. Then, technological literacy ICT literacy in its traditional form refers to the technical skills related to the use of technology (Anderson, 2008, cited in Lewin & McNicol, 2015). However, this term can also be conceptualized in a much broader way as the use of digital technology, communication tools, information literacy, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society (Kim et al, 2019).

On the other hand, Sasota et al (2021) validate the will-skill-tool (WST) model in predicting and explaining ICT integration in teaching science anmathematics in the Philippines. However, it found a different proportion of d variance explained by the model as compared to other studies. The proportion explained by the current study was closer to that of Farjon et al. (2019) that found an average proportion, indicating that the WST model explained 60% of the level of ICT integration among pre-service teachers in Dutch teacher education. The almost similar proportion may be explained in the similar method of regression analysis used. Thus, the use of multiple items in measuring ICT integration in teaching can be a good alternative to the conventional use of one-indicator construct (i.e., Stages of Adoption, Concerns-based Adoption Model, or Apple Classroom of Tomorrow Stages of Technology).

As suggested by Nelson et al. (2019), technology and content-area faculty should work hand in hand for more effective ICT-integrated teaching andlearning process. This analysis by subject teaching area, therefore, is instructive in understanding successful integration of ICT into teaching, which is contextually situated by subject area (Foulger et al. 2015). This present study confirmed past studies (Sezer, 2015) that mathematics teachers were less likely to integrate ICTs

in classrooms. It found that science teachers had higher ICT skills and integration than mathematics teachers. Moreover, ICT knowledge and skills should be a primary focus in providing teacher training programs for mathematics teachers who may have technical requirement to facilitate integration of ICT in teaching the subject.

Moreover, in Ghana, Adarkwah (2021) said that despite the significant investment of most low-income countries such as Ghana in ICT, challenges such as access to ICT, reluctance by both teachers and students o use ICT, network and electricity issues still persists in Ghana. In lieu of the online learning activity taking place in most institutions in Ghana, the study revisits how ICT is fundamental to online learning and education in general. The principal objective of the study was identify possible solutions to some perceived barriers in e-learning and ICT integration in Ghana. Findings from the study suggests that access to ICT resources in Ghanaian schools is still a challenge. As a result, students perceived the online learning is not effective. According to the students, although the online learning is a good initiative, they prefer the traditional approach as opposed to the online learning, which is fraught with a lot ofchallenges. The lack of social interactions, poor communication, and poor students' outcomes were associated with the perceived ineffectiveness of the e-learning. The students cited a lack of ICT tools, internet, electricity as some of the barriers to online learning. Most of the students interviewed did not have prior exposure to online learning or using ICT tools to study. The students believed that orientation of both teachers and students on ICT for online learning, motivation, and school leadership practices affect the integration of ICT in education. The usage of solar power gadgets, the establishment of e-learning centers, acquiring funds from e-learning centers, adoption of blended learning, and providing infrastructural support such as using mobile technologies to replace the cost of procuring laptops are some of the listed strategies for educators to consider. ICT plays an integral role in education and the economy of any country, help in resolving the barriers associated with online learning, and facilitates the successful integration of ICT in education to enhance online learning.

Dessalegn & Dagmawi (2018) opined that developed countries benefited from the integration of ICT in education, unlike developing countries. The fact that higher education plays a vital role in the success of students and countries but there is limited access in Africa, online learning can help bridge this gap (Lembani et al., 2019). It is therefore vital for stakeholders in education to integrate ICT in education in Ghana, and implement realistic and rigorous ICT policies to ensure effective online learning where the needs of both urban, urban poor, and rural students are taken into consideration. The author recommend that future research examine the effectiveness, challenges of e-learning and ICT integration in other contexts support their findings in literature with empirical evidence using a quantitative approach with a large sample.

On ICT Attitude of Teachers

The attitude of teachers toward ICT can be greatly improved prior to skills development by understanding their individual perception of how ICT can help improve student learning, as well as the reasons that hinder them from using it in their class. Based on these perceptions, the school administration can provide the enabling environment to motivate teachers to explore ICT by making ICT resources and technical support accessible to them so they can have practical knowledge and experience in using ICT even outside of actual teaching pedagogy. Peer group learning and mentoring may also be encouraged if there are teachers who are way advanced in terms of ICT skills. Schools should encourage groups of teachers to come out with their own concepts of how science and mathematics lessons can be improved by integrating ICT, and then scale up their ideas as projects or modules. Teachers may also be exposed to other teachers (within the same school or in other schools) by observing how they use ICT in their science and mathematics classes and interact with them to better understand how such practice can improve student performance. These actual exposures can provide them with options on how to construct their lessons and enable students to build on it to improve their learning and achieve the intended outcomes even prior to skills development (Sasota, et al. 2019).

Meher (2020) had the primary objective and that was to compare the attitudes of teachers, which revealed that no such statistical significance difference was found among the attitude of teachers in relation to their sex, stream and teaching experience. So it can be said that the teachers possess a strong positive attitude towards the use of ICTs in teaching-learning process, it is because the ICTs help the teacher to make their teaching faster and learning easier, it allows the teachers to save their valuable time in presenting their ideas about the subject matter, it also helps them to meet the diversified needs and demands of the students. So, the ICTs should be used in every aspect of education.

Besides, the professional knowledge and skills, teachers' attitudes, especially the beliefs that form such attitudes (Instefjord & Munthe, 2017), have received much attention. Empirical evidence lends support to the important role of beliefs in the process of technology integration (Cheng & Xie, 2018). Unsurprisingly, attitudes also play an important role in predicting the adoption of technology by teachers. Following the theory of planned behavior the attitude towards a behavior is one of three predictors for behavioral intention. Moreover, the will, skill, tool model implies attitudes are a predictor for the actual use of technology (Knezek & Christensen, 2016). Indeed, Scherer and Teo (2019) identified in their meta-analysis attitudes as a significant predictor for teachers' intention to use technology; however, they did not consider the actual use, which might be problematic.

Regarding attitudes toward ICT, two attitudinal factors, i.e., interest and perceived autonomy in using ICT, are closely associated with the reading proficiency in high-performing countries in this study. This finding is novel, as few studies have confirmed the predominant significant role of ICT-related motivation and self-efficacy in reading scores beyond capabilities. The reason for the fundamental influence of interest might be the digital learning potential reflected by the items measuring students' interest in ICT in the PISA 2015 ICT familiarity questionnaire. This potential is measured by two main items: (1) The Internet is a great resource for obtaining information in which I am interested, and (2) I am really excited about discovering new digital devices or applications (OECD, 2017). In effect, these two questions reflect acceptance of ICT related technology. ICT has brought tremendous change by offering readers the opportunity to engage in more flexible reading activities via computers.

Therefore, new effective and technological tools used in the classroom should be geared to students' interest; in particular, attractive educational applications could trigger such positive attitudes or behavior in class (Mera et al., 2019). With regard to how to perceived ICT competence in using digital devices, this study finds a slightly negative association. In the meantime, students' ICTuse for social interaction is negatively correlated with reading proficiency in the sample countries. In the PISA 2015 ICT familiarity questionnaire, the questions on this index can be generalized into two categories. One category is ICT as a theme of social communication, and the other is ICT use for social interaction. Although students might receive assistance in using digital devices from social media, using ICT for social communication exerts a greater negative correlation with reading proficiency.

Areepattamannil and Khine (2017) revealed the close connection between the frequency of ICT use for social interaction and ICT use at school. In this case, the fact that ICT's use at school is negatively associated with reading scores is attributed not only to teachers' behavior but also to students' reading activities at school. To solve this problem, appropriate direction and timely scrutiny are necessary to prevent students from becoming obsessed with online entertainment such as playing computer games and engaging in social networking activities. The significant negative impact of social interaction activities on students' reading proficiency in high-achieving countries reflects the fact that social media addiction poses a great threat to reading proficiency with the popularity of ICT.

Methodology

Research Design

This study aimed at determining the teachers' Information and Communication Technology (ICT) knowledge, skills, and attitude as a basis for the support system. It utilized a descriptive survey research design as explained by Borro (2020); descriptive survey research involves using questionnaires and statistical surveys to gather data about varying respondents. It aims to determine the extent to which different conditions exist and can be obtained among respondents. Thus, the research method was appropriate to the present study. The dependent variables were age, sex, civil status, educational attainment, and length of service, while the dependent variables were knowledge, skills, and attitude. The data were gathered using a researcher-made questionnaire. Then, the data were collected, summarized, organized, and analyzed to test the formulated hypothesis. Moreover, this study employed a non-parametric test. The mean, frequency count, and percentage were used in descriptive statistics, while the Mann Whitney U test, Kruskal Wallis, and Spearman's rho were used inferential statistics.

Respondents of the Study

The study's respondents consisted of 385 public elementary school teachers out of 10,452 respondents considered in this study for the School Year 2020-2021 in the Schools Division of Iloilo. The actual respondents of the study were determined using

a Stratified proportionate sampling utilizing Slovin's formula.

For the total population, the First District teachers were 1,942; the Second District was 1,809. The Third District was 2,885, the Fourth District was, 1,375 and the Fifth District was 2,441. Thus, the actual respondents for the First District teachers were 72 or 19 percent, the Second District was 67 or 17 percent, the Third District was 106 or 28 percent, the Fourth District was 51 or 13 percent, and the Fifth District was 90 or 23 percent.

Data Gathering Instrument

The researcher-made designed questionnaire was used to gather the data needed for the study and based on DepEds memorandum orders on ICT utilization in the schools. Other items were taken from computer books and the researcher's readings and experiences. The instrument consisted of four parts.

Part 1 was the personal profile of the respondents. It was intended to gather personal data, namely, age (young or old), sex (male or female), civil status (single, married, widow), educational attainment (bachelor, master's, doctorate), and length of service (short or long). Part 2 was 15 multiple-choice item questions for the Information and Communication Technology (ICT) knowledge. Part 3 was 25 - item questions for teachers' Information and Communication Technology (ICT) skills. It consisted of six (6) divisions: ICT basics, information and communication, computer ethics and security, word processing, electronic spreadsheet, and multimedia presentation. Then, the Part 4 was composed of 15 items that pertain to the respondents' (ICT) attitude toward school personnel.

The items for these three (3) categories, knowledge, skills, and attitudes, were based on the 5-Likert scale. To further the Likert scale, the researcher set an example like using the 5-Likert scale in the study. Each response was given a score of 5,4,3,2 and 1, respectively.

Validity of the Instrument

The researcher-made instruments were submitted for content validity and reliability using the eight-point criteria of Good and Scates. It was subjected to content validity by three experts in the area of study to determine how accurate a question, measurement, or concept corresponds to the knowledge, skills, and attitude on testing. All comments, corrections, and recommendations for the improvement or revision were incorporated in drafting the instrument, and copies were reproduced for trial testing.

Reliability of the Instrument

After validating the instrument, it was subjected to a reliability test for consistency through a pilot test administered to thirty (30) teachers in the Schools Division of Passi City. To determine the reliability coefficient, the data gathered in the pilot test were subjected to statistical procedure using Cronbach Alpha. The coefficient of correlation should be greater than 0.70 for a questionnaire to consider reliable. More so, the knowledge had 0.841, the skills had 0.866 and the attitude had 0.853 level of reliability.

Data Gathering Procedures

Before administering the questionnaire, the researcher asked for the endorsement of its research adviser, who was also the coordinator of the Graduate School in Passi City with the approval of the Dean GSC Graduate School. The Permission to conduct the study was obtained from the Division Superintendent of the Schools Division of Iloilo. Upon their approval, the researcher coordinated with the different School Heads in the different districts in the Province of Iloilo. After the data had been gathered, it was tabulated and analyzed consistent with the problems raised using the following interpretation.

Results and Discussion

Difference in the Level of Teachers' ICT Knowledge Classified According to Age, Sex and Length of Service

Table 1 shows the difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to age, sex, and length of service using the Mann-Whitney U-test.

There was no significant difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to age; the U-test was 19616.5 with a p-value of 0.814. The p-value was more significant than the 0.05 level of significance meant that there was no significant difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to age. This meant that the older teachers' didCT) knowledge does not significantly differ from that of the younger teachers. The null hypothesis that there was no significant difference in

the level of teachers' Information and Communication Technology (ICT) knowledge classified according to age was not rejected.

There was a significant difference in teachers' Information and Communication Technology (ICT) knowledge when classified according to sex. The U-test was 13497.5 with a p-value of 0.001. The p-value was less than 0.05 level of significance, which meant a significant difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to sex. This means that the male level of teachers' Information and Communication Technology (ICT) knowledge was significantly higher than the female teachers. The null hypothesis that there was a significant difference in teachers' Information and Communication Technology (ICT) knowledge when classified according to sex was not rejected.

There was no significant difference in teachers' Information and Communication Technology (ICT) knowledge when classified according to the length of service. The U-test was 19532.0 with a p-value of 0.121. The p-value was more significant than the 0.05 level of significance meant that there was no significant difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to the length of service. This implied that the short service teachers' level of knowledge does not significantly differ from that of the long length of service teachers. The null hypothesis that there was no significant difference in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to the length of service was not rejected.

Age and length of service of teachers cannot determine who among them were better in ICT except only in their classification as to sex.

Kpolovie & Iderima (2016) cited that Information and Communication Technology integration enables high-quality content and learning experiences for all learners in different locations.

Table 1. *Difference in the Level of ICT Knowledge of Teachers Classified According to Age, Sex and Length of Service*

Variable	mean rank	Sum of Ranks	U-test	p-value	Remarks
Age					
Young	198.62	38531.50	19616.5	0.814	Not Significant
Old	201.31	41268.50			
Sex					
Male	171.35	21247.50	13497.5	0.001	Significant
Female	212.92	58552.50			
Length of Service					
Short	200.77	35737.00	19532.0	0.121	Not Significant
Long	199.38	44063.00			

Differences in the Level of ICT Knowledge of Teachers Classified According to Civil Status and Educational Attainment

Table 2 shows the differences in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to civil status and educational attainment using the Kruskal Wallis H - test.

There were significant differences in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to civil status; the H-test was 11.980 with a p-value of 0.003. The p-value was less than

0.05 level of significance meant that there were significant differences in teachers' Information and Communication Technology (ICT) knowledge when classified according to civil status. The married teachers' level of information and Communication Technology (ICT) knowledge was significantly higher than the single and widow teachers. The null hypothesis that there were significant differences in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to civil status was rejected.

There were significant differences in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to educational attainment; the H-test was 32.728 with a p-value of 0.001. The p- value was less than 0.05 level of significance meant that there were significant differences in the level of teachers' Information and Communication Technology (ICT) knowledge when classified according to educational attainment. The Doctoral degree teachers' level of teachers' Information and Communication Technology (ICT) knowledge was significantly higher than the bachelor's degree and master's degree. The null hypothesis that there were significant differences in teachers' Information and Communication Technology (ICT) knowledge when classified according to educational attainment was rejected.

This shows that married teachers had learned well and the same with teachers with a doctorate. Cabrias (2021) said a high level of modular learning modalities in (ICT) of teachers when classified according to age, sex, civil status, educational attainment, position, and length of service are highly effective.

Table 2. *Difference in the Level of Teachers' ICT Knowledge Classified According to Civil Status and Educational Attainment*

Variable	Mean Rank	Df	H-test	p-value	Remarks
Civil Status					
Single	176.05	2	11.980	0.003	Significant
Married	206.21				
Widow	96.05				
Educational Attainment					
Bachelors Degree	188.27	2	14.461	0.001	Significant
Masters Degree	216.21				
Ph.D./Ed.D	353.10				

Difference in the Level of Teachers' Information and Communication Technology (ICT) Skills Classified According to Age, Sex and Length of Service

Table 3 shows the difference in the level of teachers' ICT skills when classified according to age, sex, and length of service using the Mann-Whitney U- test.

There was no significant difference in the level of teachers' ICT skills when classified according to age. The U-test was 18371.0 with a p-value of 0.0324.

The p-value was more significant than the 0.05 level of significance meant that there was no significant difference in the level of teachers' ICT skills when classified according to age. This meant that the older teachers' (ICT) skills do not significantly differ from the younger teachers. The null hypothesis that there was no significant difference in the level of teachers' ICT skills classified according to age was rejected.

There was a significant difference in the level of teachers' ICT skills when classified according to sex. The U-test was 13464.5 with a p-value of 0.002. The p-value was less than 0.05 level of significance meant that there was a significant difference in the level of teachers' ICT skills when classified according to sex. This implied that the male level of teachers' ICT skills was significantly higher than that of the female teachers. The null hypothesis that there was a significant difference in the level of teachers' ICT skills when classified according to sex was rejected.

There was a significant difference in teachers' ICT skills level when classified according to the length of service. The U-test was 16975.5 with a p- value of 0.005. The p-value was less than 0.05 level of significance meant that there was a significant difference in the level of teachers' ICT skills when classified according to the length of service. This implied that the short service teachers' level of ICT skills was significantly higher than that of the extended service teachers. The null hypothesis that there was a significant difference in the level of teachers' ICT skills when classified according to the length of service was rejected.

ICT integration extends better skills among male teachers and teachers with an extended length of service. Kpolovie & Iderima (2016) cited that Information and Communication Technology integration enables high-quality content and learning experiences for all learners in different locations.

Table 3. *Differences in the Level of Teachers' Information and Communication Technology (ICT) Skills Classified According to Age, Sex and length of Service*

Variable	mean rank	Sum of Ranks	U-test	p-value	Remarks
Age					
Young	192.18	36899.00	18371.0	0.324	Not Significant
Old	203.50	41311.00			
Sex					
Male	224.92	27889.50	13464.5	0.002	Significant
Female	185.68	50320.50			
Length of Service					
Short	179.84	31651.50	16975.5	0.05	Significant
Long	212.60	46558.50			

Differences in the Level of Teachers' Information and Communication Technology (ICT) Skills Classified According to Civil Status and Educational Attainment

Table 4 shows the differences in the level of teachers' ICT skills when classified according to civil status and educational attainment using the Kruskal Wallis H - test.

There were no significant differences in teachers' ICT skills level when classified according to civil status; the H-test was 1.246 with a p-value of 0.536. The p-

value was more significant than the 0.05 level of significance meant that there were no significant differences in the level of teachers' ICT skills when classified according to civil status. The married teachers' level of ICT skills does not significantly differ from the single and widow teachers. The null hypothesis that there were no significant differences in the level of teachers' ICT skills when classified according to civil status was not rejected.

There were no significant differences in teachers' ICT skills level when classified according to educational attainment; the H-test was 1.287 with a p- value of 0.525. The p-value was more significant than the 0.05 level of significance meant that there were no significant differences in the level of teachers' ICT skills when classified according to educational attainment. The Doctoral degree teachers' level of ICT skills does not significantly differ from the bachelor's degree and master's degree. The null hypothesis that there were no significant differences in teachers' ICT skills when classified according to educational attainment was not rejected.

This study shows that using ICT tools and equipment will prepare an active learning environment that is more interesting and effective for teachers when they are classified according to their civil status and educational attainment with its usage and able to make use of it for teaching and learning.

Ghavifekr (2016) found that professional development training programs for teachers also played a crucial role in enhancing students' quality of learning. For future studies, there is a need to consider other aspects of ICT integration, especially from the management point of view regarding strategic planning and policymaking.

Table 4. *Differences in the Level of Teachers' Information and Communication Technology (ICT) Skills Classified According to Civil Status and Educational Attainment*

Variable	Mean Rank	Df	H-test	p-value	Remarks
Civil Status					
Single	181.72	2	1.246	0.536	Not Significant
Married	200.49				
Widow	180.95				
Educational Attainment					
Bachelor's Degree	194.48	2	1.287	0.525	Not Significant
Master's Degree	202.71				
Ph.D./Ed.D	243.90				

Difference in the Teachers' Information and Communication Technology (ICT) Attitude Classified According to Age, Sex and Length of Service

Table 5 shows the difference in the teachers' attitude towards ICT when classified according to age, sex, and length of service using the Mann-Whitney U- test.

There was no significant difference in the teachers' attitude towards ICT when classified according to age. The U-test was 19213.5 with a p-value of 0.676. The p-value was more significant than the 0.05 level of significance meant that there was no significant difference in the level of teachers' attitude towards ICT when classified according to age. This meant that the older teachers (ICT) attitude does not significantly differ from the younger teachers. The null hypothesis that there was no significant difference in the teachers' attitude towards ICT classified according to age was not rejected.

There was a significant difference in the teachers' attitude towards ICT when classified as to sex, and the U-test was 14299.5 with a p-value of 0.008. The p-value was less than the significance level, which meant a significant difference in teachers' attitude towards ICT when classified according to sex. This implied that the male teachers' ICT attitude was significantly higher than that of the female teachers. The null hypothesis that there was a significant difference in teachers' attitudes towards ICT when classified according to sex was rejected.

There was no significant difference in the teachers' attitude towards ICT when classified according to the length of service. The U-test was 19297.0 with a p-value of 0.686. The p-value was more significant than the 0.05 level of significance meant that there was no significant difference in the teachers' attitude towards ICT when classified according to the length of service. This implied that the short service teachers' attitudes towards ICT do not significantly differ from those of more extended service teachers. The null hypothesis that there was no significant difference in the attitude towards ICT when classified according to the length of service was not rejected.

This means that age and length of service did not attempt to have differences in teachers' ICT attitudes compared to the attitude of teachers based on their sex. Meher et al. (2020) present study investigate the attitude of teachers teaching at Gangadhar Meher University, Sambalpur, towards the use of ICT descriptively and comparatively. The study's findings

also revealed no significant difference among the attitude of teachers concerning their sex and stream.

Table 5. *Difference in the Teachers' Information and Communication Technology (ICT) Attitude Classified According to Age, Sex, and length of Service*

Variable	mean rank	Sum of Ranks	U-test	p-value	Remarks
Age					
Young	196.53	38323.50	19213.5	0.676	Not Significant
Old	204.28	41876.50			
Sex					
Male	223.18	27674.50	14299.5	0.008	Significant
Female	190.31	52525.50			
Length of Service					
Short	197.91	35228.00	19297.0	0.686	Not Significant
Long	202.58	44972.00			

Differences in the Teachers' Information and Communication Technology (ICT) Attitude Classified According to Civil Status and Educational Attainment

Table 6 shows the difference in the teachers' attitude towards ICT when classified according to civil status and educational attainment using the Kruskall Wallis H - test.

There were no significant differences in the level of teachers' attitude towards ICT when classified according to civil status; the H-test was 1.606 with a p-value of 0.448. The p–value was greater than 0.05 level of significant meant that there were no significant differences in the teachers' attitude towards ICT when classified according to civil status. The married teachers' attitude towards ICT do not significantly differ than the single and widow teachers. The null hypothesis that there were no significant differences in the teachers' attitude towards ICT when classified according to civil status were not rejected.

There were significant differences in the teachers' attitude towards ICT when classified according to educational attainment; the H-test was 32.728 with a p-value of 0.035. The p–value was less than 0.05 level of significant meant that there were significant differences in the teachers' attitude towards ICT when classified according to educational attainment. The Doctoral degree teachers' level of teachers' attitude towards ICT was significantly higher than the bachelor's degree and master's degree. The null hypothesis that there were significant differences in the teachers' attitude towards ICT when classified according to educational attainment were rejected.

This means that the higher the educational attainment of teachers, the higher ICT attitude they were. They can fully integrate and utilize ICT in teaching.

Tomaro (2018) discussed in her study Developing Information Communication Technology (ICT) Curriculum Standards for K-12 Schools in the Philippines. The critical analysis of the reviewed papers revealed several policy actions to fully integrate ICT in education in the case of the Philippines such as added training for teachers, provision of computer infrastructures, integration of ICT in the curriculum in a strategized manner, and lastly a strong leadership.

Table 6. *Differences in the Teachers' Information and Communication Technology (ICT) Attitude Classified According to Civil Status and Educational Attainment*

Variable	Mean Rank	Df	H-test	p-value	Remarks
Civil Status					
Single	201.57	2	1.606	0.448	Not Significant
Married	201.74				
Widow	157.32				
Educational Attainment					
Bachelor's Degree	190.26	2	6.724	0.035	Significant
Master's Degree	216.86				
Ph.D./Ed.D	270.10				

Relationships among the Level of teachers' Information and Communication Technology (ICT) knowledge, skills and attitude

To find out the relationships among the level of teachers' Information and Communication Technology (ICT) knowledge, skills, and attitude the researcher used the Spearman's rho.

Table 7 shows that there was no significant relationship between the level of teachers' Information and Communication Technology (ICT) knowledge and skills. The Spearman's rho was -0.082 with a p-value of 0.103. The p–value was greater than 0.05 level of significant meant that there was no significant negative relationship between the level of teachers' Information and Communication Technology (ICT) knowledge and skills. This implied that when the level of knowledge was very satisfactory, the skills was high. The results denotes negligible relationship.

There was no significant relationship between the

teachers' Information and Communication Technology (ICT) knowledge and attitude. The Spearman's rho was 0.089 with a p-value of 0.077. The p–value was greater than 0.05 level of significant meant that there was no significant relationship between the level of teachers' Information and Communication Technology (ICT) knowledge and attitude. This implied that when the level of knowledge was very satisfactory, the attitude was very favorable. The results denotes negligible relationship.

There was a significant relationship between the level of teachers' Information and Communication Technology (ICT) knowledge, skills and attitude. The Spearman's rho was 0.651 with a p-value of 0.000. The p–value was less than 0.05 level of significant meant that there was a significant relationship between the level of teachers' Information and Communication Technology (ICT) skills and attitude. This implied that when the level of skill was high, the attitude was very favorable. The results denotes substantial or marked relationship.

Finally, results show that ICT supports the acquisition and assessment of 21st Century Skills, thereby recognizing the importance of ICT as a tool for developing 21st Century skills and attitude in the individual.

Although 21st Century Skills and digital skills are both seen by commentators as crucial attributes, and while there is some significant conceptual crossover between the two, Van Laar et al. (2017) conclude that the combination is not yet sufficiently defined.

Table 7. *Relationships among the Teachers' Information and Communication Technology (ICT) Knowledge, Skills and Attitude*

Correlations

			Knowledge	Skills	Attitude	Remarks
Spearman's rho	Knowledge	Correlation Coefficient	1.000	-.082	.089	Not Significant
		Sig. (2-tailed)		.103	.077	
		N	399	394	399	
	Skills	Correlation Coefficient	-.082	1.000	.651**	Not Significant
		Sig. (2-tailed)	.103		.000	
		N	394	395	395	Significant
	Attitude	Correlation Coefficient	.089	.651**	1.000	
		Sig. (2-tailed)	.077	.000		
		N	399	395	400	

**. Correlation is significant at the 0.01 level (2-tailed).

Conclusion

Based on the findings, the following conclusions were drawn: (1)The ICT teachers has a very satisfactory knowledge in ICT. They were equipped, especially to teachers with doctoral degree. In this sense, it assist teachers to the global requirement of technology-based teaching and learning tools and facilities. (2) The teachers' ICT were skillful the way they do formatting data, operating a computer, downloading web pages, apply common courtesies and acceptable use policies while telecomputing, format document, and using cells. They were highly skilled in Information Communication Technology and led to effective ICT-integrated teaching and learning process. Meanwhile, managing documents was not determined as one of their skills. (3) Attitude of ICT teachers mean to a success in the delivery and monitoring of instructions. They had an attitude on establishing a sound testing process, procedures and mechanisms to apply task towards learners by having functional ICT at school. Inversely, their attitude on having digital and ICT integration, policy on Data Privacy Act. They do not encourage feedback on teachers through Digital media exercise teachers judgment and decisions. (4) Some significant differences existed on ICT teachers' knowledge this implies that each of the variables has something to contribute with one another. Their classification as to sex enables to determine the provision of high quality content and learning experiences, it applies to married teachers and doctorate degree teachers. (5) Sex and length of service matters in the ICT skills teachers would have while no effect on ICT teachers being older or younger and the member of years of experience. (6) Attitude of ICT teachers were affected as to being male or female and the degree earned while no bearing at all, as they are young or old, single or married and have stayed in the service for shorter or longer period of experiences. (7) Skills and attitude matters among ICT teachers while ICT teachers knowledge and skills and attitude has no bearing at all.

The following recommendations were based on the foregoing findings and conclusions by the researcher: (1) The teachers should maintain and strengthen their ICT Knowledge on formatting data and numbers using different style and options sort and filter their data and files. (2) The school heads should conduct seminars workshop on ICT to teachers on how to manage their documents such as create a new document, save the newly created document, open, edit, save and close existing document as this was some of the deficiency of teachers to store their modules and learning activity

sheets. (3) The teachers should have an external drive and flash dick to store their data and make back up of the very important files such as the module and LAS. (4) The school heads should establish a sound testing process, procedures and mechanisms and have an established and functional ICT system in school. (5) The teachers should have a strong support to the digital and ICT integration of Dep Ed amidst this pandemic for classes information and reports are done digitally. (6) The school heads should assigned a teachers in the school as Freedom of Information Officer (FIO) to implement a policy on Data Privacy Act. (7) Parallel studies on the level of teachers' Information and Communication Technology (ICT) knowledge, skills and attitude on other level and venue is recommended in order to validate the results of this study.

References

Adarkwah, M.A. (2021). "I'm not against online teaching, but what about us?": ICT in Ghana post Covid-19. Educ Inf Technol 26, 1665–1685 (2021). https://doi.org/10.1007/s10639-020-10331-z

Akin, M. (2017). A research on the impacts of the young people's internet addiction levels and their social media preferences. International Review of Management and Marketing, 7 (2), 256-262.

Almerich, G.; Orellana, N.; Suárez-Rodríguez, J.; Díaz-García, I. Teachers' information and communication technology competences: A structural approach. Comput. Educ. 2016, 100, 110–125.

Areepattamannil, S., and Khine, M. S. (2017). Early adolescents' use of information and communication technologies (ICTs) for social communication in 20 countries: examining the roles of ICT-related behavioral and motivational characteristics. Comput. Hum. Behav. 73, 263–272. doi: 10.1016/j.chb.2017.03.058

Cheng, S.-L. and Xie, K. (2018). The relations among teacher value beliefs, personal characteristics, and TPACK in intervention and non- intervention settings Teaching and Teacher Education, 74 (2018), pp. 98-113.

Dessalegn, M., & Dagmawi, L. (2018). The promises and challenges of ICT- pedagogy integration in developing countries: The case of Ethiopia. International Journal of Education, 1(7), 6–8.

Deviam, M. (2016). ICT literacy among Bed Trainees.

Di Gangi, P. M. & Wasko, M. M. (2016). Social media engagement theory: Exploring the influence of user engagement on social media usage. Journal of Organizational and End User Computing (JOEUC), 28(2), 53-73.

Elvira P. Espenida, Effect of Internet Addiction on the Academic Performance of Junior and Senior High School Students of Mapanas Agro-Industrial High School, Mapanas, Northern Samar: University of Eastern Philippines Extension Services Collaborative Output

Erdoğan, Çağrı & Topuz, Ramazan. (2020). Investigation of Internet Addiction Levels of Physical Education Teachers. Asian Journal of Education and Training. 6. 169-175. 10.20448/journal.522.2020.62.169.175.

Farjon, D., Smits, A., & Voogt, J. (2019). Technology integration of pre-service teachers explained by attitudes and beliefs, competency, access, and experience. Computers & Education., 130(2019), 81–93.

Franklina Adjoa Yebowaah (2016). Internet Use and its Effect on Senior High School Students in Wa Municipality of Ghana

Gedam S.R., Ghosh, S., Modi, L., Goyal, A., Mansharamani, H. (2017). Study of internet addiction: Prevalence, pattern, and psychopathology among health professional undergraduates. Indian Journal of Social Psychiatry, 33:305-11.

Habibov, N.; Auchynnikova, A.; Luo, R. The effect of different types of education on the likelihood of employment in 29 post-communist countries of Eastern Europe and the former Soviet Union. High Educ. Ski. Work.

Learn. 2019, 9, 723–738.

Instefjord, E.J. and Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher educationTeaching and Teacher Education, 67 (2017), pp.

Kim, H., Care, E., & Vista, A. (2019b). Education systems need alignment for teaching and learning 21st Century Skills. Washington, DC: Brookings.

Kjellsdotter, A. What matter(s)? A didactical analysis of primary school teachers' ICT integration. J. Curric. Stud. 2020, 52, 823–839

Knezek, G. and Christensen, R. (2016). Extending the will, skill, tool model of technology integration: Adding pedagogy as a new model construct. Journal of Computing in Higher Education, 28 (3) (2016), pp.

Lembani, R., Gunter, A., Breines, M., & Dalu, M. T. (2019). The same course, different access: The digital divide between urban and rural distance education students in South Africa. Journal of Geography in Higher Education, 44(1).

Lewin, C., & McNicol, S. (2015). Supporting the development of 21st Century Skills through ICT. In Brinda, T., Reynolds, N., Romeike, R., & Schwill, A. (Eds.), KEYCIT 2014: Key competencies in informatics and ICT (pp. 181–198).

Mera, C., Ruiz, G., Aguilar, M., Aragón, E., Delgado, C., Menacho, I., et al. (2019). Coming together: R&D and children's entertainment company in designing apps for learning early Math. Front. Psychol. 9:2751. doi: 10.3389/fpsyg.2018.02751

Murithi, J., Yoo, J.E. Teachers' use of ICT in implementing the competency-based curriculum in Kenyan public primary schools. Innov Educ 3, 5 (2021). https://doi.org/10.1186/s42862-021-00012-0

OECD (2017). PISA 2015 Technical Report. Paris: OECD Publishing.

Ovute AO, Ovute LE (2017). Extent of ICT software availability and teacher trainers' ICT literacy level in vocational education department: A case study of two federal colleges of education in Nigeria. International Journal of Current Research and Academic Review. 3(5), 314- 318.

Pettersson, F. On the issues of digital competence in educational contexts—A review of literature. Educ. Inf. Technol. 2018, 23, 1005–1021.

Rommel L. Verecio (2016) Online Gaming Addiction among BSIT Students of Leyte Normal University Philippines its Implication towards Academic Performance

Sasota, R.S., Cristobal, R.R., Sario, I.S. et al. Will–skill–tool (WST) model of technology integration in teaching science and mathematics in the Philippines. J. Comput. Educ. 8, 443–464 (2021).

Scandurra, R.; Calero, J. How adult skills are configured? Int. J. Educ. Res. 2020, 99, 101441.

Scherer, R. and Teo, T. (2019). Unpacking teachers' intentions to integrate technology: A meta-analysis Educational Research Review, 27 (2019), pp. 90-109.

Suwana, F. & Lily (2017). Epowering Indonesian women through building digital media literacy. Kasetsart Journal of Social Science.

Taherdoost, H. A review of technology acceptance and adoption models and theories. Procedia Manuf. 2018, 22, 960–967.

UNESCO (2016). UNESCO Global Education Monitoring Report. Education for the people and the planet: Creating sustainable future for all. A global measure of digital and ICT literacy skills.

UNESCO (2018). A global framework of reference for digital literacy skills for indicator 4.4.2. Information Paper No. 51.

Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. Computers in Human Behaviour, 72, 577–588.

Xiao, Y. ; Liu, Y. ; Hu, J. (2019). Regression Analysis of ICT Impact Factors on Early Adolescents' Reading Proficiency in Five High-Performing Countries.

Affiliations and Corresponding Information

John L. Paciente, PhD
Iprog Elementary School
Department of Education - Schools Division of Iloilo
Philippines