

Teachers' Competence in Information and Communications Technology

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Abstract

Given the pervasiveness of technology in today's schools, the proficiency of educators with information and communications technology (ICT) is critically important. This study aims to determine teachers' competence in information and communications technology in technology operations, pedagogical skills, and professional competency. Data for this descriptive study was collected from 90 respondents using a 30-item self-made data-gathering instrument that has passed the rigorous validity and reliability test. The assembled information was dealt with using the mean and Mann-Whitney U-tests. Results revealed that teachers had a high level of competence in ICT in technology operations and pedagogical skills and a moderate level in the professional area. A difference was found in the teachers' ICT competence in three areas when compared according to sex, and a difference was also found in the professional area when compared according to age. The result provides evidence that teachers are proficient in ICT; however, their ICT competence varies based on gender and age. This study calls for a continuous, high-quality training program in all regional secondary schools to maintain teachers' ICT competence.

Keywords: Information and Communications Technology, ICT Competence, Secondary School Teachers, Negros Oriental

Bio-Note:

Arnold B. Medez is an ICT teacher at Manjuyod National High School. He holds a Bachelor of Science in Computer Education degree Minor in Mathematics degree from Negros Oriental State University in 2001. He is the district ICT Coordinator of Manjuyod District

Introduction

Nature of the Problem

Teachers must be competent in Information and communications Technology to successfully teach and communicate with students in direct and virtual environments (Thai et al., 2022). Hence, a teacher must be knowledgeable on technology operations, pedagogical skills, and the professional use of ICT for teaching and learning.

In the present research venue, the researcher observed that the use of ICT in the teaching and learning process remains a challenging task on the part of public secondary teachers due to lack of training in integrating ICT, lack of confidence and competence in ICT, lack of technical support and lack of accessibility to ICT resources. At the same time, some teachers were struggling with using ICT in their administrative jobs. This is because they need more ICT competence in technology operations, pedagogy, and professional competency. Thus, harnessing ICT continues to be an essential challenge to educators.

Current State of Knowledge

Digital technology is constantly defining society in the present world, where the digitalization of organizations is progressing from being innovative to being part of their basic activities (Treceñe, 2021). Thus, educators should recognize that 21st-century learners should be equipped with the necessary skills and experience that will enable them to contribute to the growing global community. De la Fuente and Biñas (2020) revealed that teachers' Information and Communications Technology competence in different skill sets is intermediate. Moreover, age, gender, the highest educational attainment, and teaching position have no significant effect on the ICT competence of teachers. However, the number of teachers who attended ICT-related seminars and training in ICT basics, spreadsheets, computer ethics, and security was significant.

In a public secondary school, Samonte and Guzman (2019) evaluated the ICT proficiency of the teachers. They found that teachers' ICT competence was advanced regarding technology operations and concepts, while their pedagogical competence was only basic. More is needed to say that teachers are already competent and skilled in ICT.

Caluza et al. (2017) investigated the level of ICT competence of teachers in a public school. The survey found that most teachers only possess rudimentary ICT skills and could do better. In order to improve and elevate the quality of education at the aforementioned elementary public school, more training is required for the teachers to include ICT in their lessons and other relevant tasks that they are assigned.

Theoretical Underpinnings

This study is anchored on the Unified Theory of Acceptance and Use of Technology by Venkatesh, Moris, Davis, and Davis (2003). The unified Theory of Acceptance and Use of Technology is based on the user's perception of usefulness and the perceived ease of use as cited by The perceived usefulness of technology relates to the conviction among users such as teachers that it will do their work, thus enhancing job performance (Muinde & Mbataru, 2019). This means that if teachers think that using computers would make their day-to-day activities such as preparing lesson plans, lesson materials, or analyses of students' results more organized and accurate, they would probably use them. The perceived ease of use of new or existing technology would mean that the users view technology as one that only requires a little effort to learn how to use it (Venkatesh et al., 2003). This suggests that teachers could possibly adopt technology that they consider easy to learn and use with minimal need for expert consultation.

Relating this theory to this study, it is understood that apart from globalization, technology acceptance and usage these days provide comfort and ease for users – particularly for learners and teachers. Suppose the teacher used to carry voluminous files before, during, and after exams. In that case, nowadays, files can be easily compacted and saved in the cloud or a thin disk – all without going through the usual discomfort and unease. Information processing and exchanging can be done in real-time in split seconds using the digital platform. The technology acceptance theory speaks of modern adaptations our system of education must adopt. Otherwise, learning stops when people cease to be adept with technology.

Objectives

This study aimed to determine the teachers' competence in information and communications technology (ICT). More specifically, it aimed to determine 1) the level of teachers' ICT competence in terms of technology operations, pedagogical skills, and professional competence; and 2) the significant difference in the level of teachers' competence in ICT when grouped by age, sex at birth, plantilla position, and several ICT-related training.

Hypothesis

There is no significant difference between the level of teachers' competence in ICT when grouped according to the above demographics.

Methodology

This portion presents the research design, respondents, instrument, data gathering procedure, and data analysis.

Research Design

This paper used a descriptive research design to determine teachers' competence in information and communications technology (ICT). Descriptive research is fact-finding with adequate interpretation (Nachimas & De Ward, 2015).

Study Respondents

The respondents were the 90 secondary public-school teachers in one of the municipalities of Negros Oriental. The researcher used purposive sampling, as all respondents to the survey fit a particular profile for the study.

Instrument

This study employed a self-made questionnaire with 30 items on teachers' ICT competence in technology operations, pedagogical, and professional skills. The survey questionnaire was presented to three (3) validators who are experts in the fields of education and research for further evaluation, comments, and suggestions. The validity index obtained a score of 5.00, interpreted as excellent, making the instrument valid. The reliability of the questionnaires was assessed through a dry-run test involving 30 teachers who were not part of the actual respondents to the study. The collected data was analyzed using the Cronbach's alpha formula to determine the reliability rating. The computed alpha for this study was 0.959, interpreted as excellent, indicating the research instrument is reliable.

Data Collection Procedure

The researcher sought permission from the Schools Division Superintendent. Upon approval, the researcher went to the identified schools and presented the approved letter to the school principals. Scheduled appointments were arranged for the actual survey and retrieval to give enough time for the respondent to reflect and to ensure more accurate and quality information. The questionnaires were gathered, recorded, and analyzed. The data gathered from the responses of the respondents was tallied and tabulated using the appropriate statistical tools. The Statistical Package for Social Sciences (SPSS) was used to process the encoded data in the computer.

Data Analysis and Statistical Treatment

Objective No. 1 used the descriptive analytical scheme and weighted mean to determine the level of teachers' ICT competence in technology operation, pedagogy, and professionalism. Objective No. 2 used the comparative analytical scheme and Mann-Whitney U-test to determine the significant difference in the level of teachers' ICT competence when grouped and compared according to profile variables.

Ethical Considerations

To ensure ethical considerations of research, all participants were informed about the details of the study. Participation in the study was voluntary, and the participants could withdraw without any consequences. They were informed about the academic purpose of the study. The researchers guaranteed the anonymity of the participants by assigning encrypted codes. Confidentiality was ensured as only the researchers had access to the research data.

Results and Discussions

In this section, the data gathered were further treated, presented, analyzed, and interpreted to focus on the specific objectives of the study.

Level of Teachers' Competence in ICT in Technology Operations, Pedagogical Skills, and Professional Skills

The first objective was to determine teachers' ICT competence in technology operations, pedagogical skills, and professional competency.

Table 1

Level of Teachers' Competence in ICT in Technology Operations

Items	Mean	Interpretation
<i>As a secondary school teacher, I am/can/have...</i>		
1. capable of entering, editing, graphics, saving, and retrieving text files using the word processing program.	3.96	High Level
2. capable of encoding data, sorting data, and formatting cells in tables using spreadsheets.	3.88	High Level
3. make computations, use formulas, and create graphs using spreadsheets.	3.44	Moderate Level
4. capable of using PowerPoint presentation package and LCD projectors for classroom instruction	4.31	High Level
5. capable of using storage devices (i.e., hard disk, CD, flash memory, etc.) for storing and sharing computer files.	4.12	High Level
6. capable of doing basic troubleshooting and repair.	2.73	Moderate Level
7. ability and understanding of the fundamentals of computer operations and concepts.	3.52	High Level
8. knowledge of how to safeguard a computer from viruses, spyware, adware, malware, hackers, and other threats.	3.17	Moderate Level
9. capable of downloading and installing relevant applications useful for classroom instructions.	3.81	High Level

10. navigate reliable educational websites and platforms for instructional purposes.	3.66	High Level
Overall Mean	3.67	High Level

Table 1 shows the teachers' ICT competence in technology operations, with an overall mean of 3.67, interpreted as a high level. This indicates that most secondary school teachers know and understand technology operations. The respondents can use PowerPoint presentations for classroom instruction, with a mean score of 4.31. However, the result was low for basic troubleshooting and repair, with a mean score of 2.73. These problems are common among teachers while performing their jobs, and they could be improved in the delivery of teaching and learning to the students. As a result, some teachers who need to be more experienced in ICT limit their confidence when using ICT for the teaching and learning process. The result suggests that teachers must take time to review and learn the existing computer hardware and software to improve their confidence in using ICT. The finding was affirmed by that of Calluza et al. (2017). The researchers found that the teachers need to gain basic skills in technology operations, particularly in using online and offline help facilities for troubleshooting, maintenance, and updating of applications. In the same manner, Samonte and Guzman (2019) revealed that most teachers have basic knowledge in demonstrating knowledge and skills in essential computer operation and other information devices.

Table 2

Level of Teachers' Competence in ICT in Pedagogical Skills

Items	Mean	Interpretation
<i>As a secondary school teacher, I...</i>		
1. apply ICT supported strategies to manage students' learning	4.10	High Level
2. design effective learning experiences and create rich learning environments with the support of ICT	3.83	High Level
3. explore and apply ICT in cooperative learning and peer interaction	3.71	High Level
4. use synchronous (Google Classroom, Meet, Webex chat, etc) activities in facilitating class discussions and meetings	2.94	Moderate Level
5. use electronic means of administering quizzes and examinations.	3.16	Moderate Level
6. use emails, messenger, group sites, blogs, etc., for disseminating information directly to students, colleagues, and parents.	3.98	High Level
7. use word processing and spreadsheets in preparing learning materials and other administrative school-related reports	4.02	High Level
8. use appropriate slide presentations, videos, audio, and other media in the classroom.	4.16	High Level
9. design rubrics for assessing student performance using various technologies.	3.59	High Level

10. teach students to use various multimedia materials for the reports and presentations.	3.49	Moderate Level
Overall Mean	3.69	High Level

Table 2 shows the teachers' competence in ICT in pedagogical skills, with an overall mean of 3.69, interpreted as high level. It means that most of the secondary school teachers exhibit pedagogical competence in ICT. The respondents are competent at using slide presentations, videos, audio, and other media in the classroom, with a mean score of 4.16. However, using synchronous activities to facilitate class discussions was low, with a mean score of 2.94. The respondents have less knowledge of the use of modern digital technologies, which is a great disadvantage in facilitating synchronous distance education. The result is affirmed by that of Dimaculangan et al. (2022). The researchers found that the challenges faced by the teachers in synchronous online teaching resulted from a need for more technology and digital pedagogical proficiency. As such, opportunities to enhance their knowledge and skills in digital pedagogy and more student-centered online teaching approaches can be a gateway to addressing the challenges posed. Likewise, Omboto and Kanga (2022) revealed that public school teachers need more relevant ICT skills such as assistive technology to support teaching and learning, making it difficult for them to demonstrate their competency and apply the same to teaching children.

Table 3*Level of Teachers' Competence in ICT in Professional Skills*

Items	Mean	Interpretation
<i>As a secondary school teacher, I</i>		
1. join online communities, subscribing to relevant online journals.	3.12	Moderate Level
2. review new and existing software for education.	3.01	Moderate Level
3. can browse safe and credible websites.	3.51	High Level
4. actively participate in online forums and discussions.	3.30	Moderate Level
5. can share lesson plans and teaching materials through websites.	3.39	Moderate Level
6. demonstrate proper handling of computer devices and use of applications.	3.57	High Level
7. conduct research on the use of technology in the classroom	3.19	Moderate Level
8. use ICT to attend DepEd Webinars and other online seminars and training.	3.67	High Level
9. can show respect for privacy and cyber etiquette and similar use of technology.	3.98	High Level
10. can enroll in online seminars, trainings, and tutorials related to education.	3.62	High Level
Overall Mean	3.44	Moderate Level

Table 3 depicts the teachers' competence in ICT in professional skills with an overall mean of 3.44, interpreted as a moderate level. It shows that most secondary school teachers rarely engage in ICT professional development and training. The respondents show respect for privacy, cyber etiquette, and similar use of technology, with a mean score of 3.98. However, reviewing new and existing software for education was low, with a mean score of 3.01. Teachers have many responsibilities and workloads; hence, attendance in ICT professional development was their least priority. This suggests that teachers need to upgrade their level of competence in the professional area to become more proficient in performing their duties and responsibilities. The finding aligns with that of Marcial and Fortich (2015). Their study revealed that the level of professional competence in ICT among teacher educators was fair, particularly in properly using various software and applications. In addition, the integration of ICT in the professional growth of teacher educators is only at the awareness level. However, the finding contradicts the study conducted by Rizkiani (2022), wherein she found that the professional competence of pre-service English teachers implementing ICT is at a very good level using the right software and applications for the teaching and learning process.

Comparative Analysis in the Level of Teachers' Competence in ICT in Technology Operations, Pedagogical Skills, and Professional Skills When Grouped According to the Aforementioned Variables

The second objective was to determine the significant difference in the level of teachers' ICT competence in technology operations, pedagogical skills, and professional skills when grouped and compared according to variables.

Table 4

Difference in the Level of Teachers' Competence in ICT in Technology Operations When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U	p-value	Sig. level	Interpretation
Age	Younger	45	48.92	858.50	0.213		Not Significant
	Older	45	42.08				
Sex	Male	26	54.13	607.50	0.045	0.05	Significant
	Female	64	41.99				
Plantilla Position	Lower	23	42.46	700.50	0.517		Not Significant
	Higher	67	46.54				

Number of ICT-Related Training	Few	3	39.02	726.50	0.073	Not Significant
		3				
	Many	5	49.25			
		7				

Table 4 presents the comparative analysis of teachers' ICT competence in technology operations when compared according to age, sex, plantilla position, and number of trainings attended. The computed p-values for age, plantilla position, and number of trainings attended are 0.213, 0.517, and 0.073, respectively, indicating no significant difference. However, the computed p-value for variable sex is 0.045, which indicates a significant difference. The result entails that teachers' ICT competence in technology operations varies when compared according to sex. The implication is that men have a higher positive attitude that they can learn the latest technologies ahead of women. The finding is supported by Laxmi and Jabin (2022), who found that there is a significant difference in the competency in ICT of male and female secondary school teachers.

Table 5

Difference in the Level of Teachers' Competence in ICT in Pedagogical Skills When Grouped According to the Aforementioned Variables

Variable	Categor y	N	Mean Rank	Mann Whitney U	p- value	Sig. level	Interpretatio n
Age	Younger	4	49.37	838.50	0.160		Not Significant
		5					
	Older	4	41.63				
		5					
Sex	Male	2	55.42	574.00	0.021	0.05	Significant
		6					
	Female	6	41.47				
		4					
Plantilla Position	Lower	2	46.54	746.50	0.824		Not Significant
		3					
	Higher	6	45.14				
		7					
Number of ICT-Related Trainings	Few	3	44.82	918.00	0.850		Not Significant
		3					
	Many	5	45.89				
		7					

Table 5 shows the comparative analysis of teachers' ICT competence in pedagogical skills when compared according to age, sex, plantilla position, and number of trainings attended. The computed p-values for age, plantilla position, and number of trainings attended are 0.160, 0.824, and 0.850, respectively, indicating no significant difference. However, the computed p-value for variable sex is 0.021, which indicates a

significant difference. This result entails that teachers' ICT competence in pedagogical skills differs when compared according to sex. The implication is that male teachers have higher confidence in the use of ICT for the teaching and learning process. Moreover, men believe that they have greater computer experience than women and consider themselves to be ahead of others concerning computer or Internet use. The result is consistent with that of Odual (2019), who found a gender difference between male and female teachers' perceptions of ICT in secondary schools, with male teachers reporting positive perceptions more often than female teachers.

Table 6

Difference in the Level of Teachers' Competence in ICT in Professional Skills When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U	p-value	Sig. level	Interpretation
Age	Younger	45	51.86	726.50	0.021		Significant
	Older	45	39.14				
Sex	Male	26	54.50	598.00	0.037	0.05	Significant
	Female	64	41.84				
Plantilla Position	Lower	23	49.74	673.00	0.367		Not Significant
	Higher	67	44.04				
	Few	33	40.32	769.50	0.152		Not Significant

Number of ICT-Related Training	Many	5 7	48.50
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Table 6 depicts the comparative analysis of teachers' ICT competence in professional skills when compared according to age, sex, plantilla position, and number of trainings attended. The computed p-values for plantilla position and number of trainings attended are 0.367 and 0.152, respectively, indicating no significant difference. However, the computed p-values for age and sex are 0.021 and 0.037, which indicates a significant difference. The result entails that teachers' ICT competence in their professional skills varies when compared according to age and sex. The implication is that older female teachers who were used to the traditional method did not desire to use modern tools in their classroom instructions. Older female teachers critiqued themselves as too old to adapt to the new ICT tools and did not want to accept the new methods of teaching. The finding contradicts that of Keržič et al. (2021). The result revealed that age is not a factor in instructional ICT use, although some age-related differences appear in teachers' personal ICT use. Whereas Marcial and Fortich (2015) revealed that male respondents have a higher level of ICT competency in their professional areas than females.

Conclusion

In general, teachers' high level of ICT competence in technology operations, pedagogical, and professional areas is a manifestation that teachers welcome to learn new and upcoming technologies. Skills in basic trouble shooting, the use of synchronous online activities, and existing and latest software applications is something that must be mastered also by teachers in the 21st century. These findings call for a continuous, high-quality training program in all secondary schools in the region to maintain teachers' ICT competence.

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References

- Caluza, L. J. B., Verecio, R. L., Funcion, D. G. D., Quisumbing, L. A., Gotardo, M. A., Laurente, M. L. P., & Marmita, V. (2017). An assessment of ICT competencies of public school teachers: basis for community extension program. *IOSR Journal of Humanities and Social Science*, 22(3), 1- 13. doi:10.9790/0837-2203040113
- Dimaculangan, Kristine & Hadji Abas, Hanifa & Quinto, Celestie. (2022). Narrative Study of Teaching Strategies and Challenges Encountered by Teachers in

- Synchronous Online Classes. *International Journal of Social Learning (IJSL)*. 2. 201-216. [10.47134/ijsl.v2i2.113](https://doi.org/10.47134/ijsl.v2i2.113).
- Keržič, D., Danko, M., Zorko, V., & Dečman, M. (2021). The effect of age on higher education teachers' ICT use. *Knowledge Management and E-Learning*, 13(2), 182–193. doi.org/10.34105/j.kmel.2021.13.010
- Laxmi, R. & Jabin S. (2022). Competency in ICT among secondary teachers in relation to gender and locality. *International Journal of Creative Research Thoughts*, 10(12). <https://ijcrt.org/papers/IJCRT2212386.pdf>
- Marcial, D. & Fortich, M. (2015). ICT skills enhancement training in teacher education: the case in Central Visayas, Philippines. *Information Technologies and Learning Tools*, 39(1), 230-239 <https://doi.org/10.33407/itlt.v39i1.964>
- Muinde, S. M. & Mbataru, P. (2019). Determinants of implementation of public sector projects in Kenya: a case of laptop project in public primary schools in Kangundo sub-County, Machakos County. *International Academic Journal of Law and Society*, 1(2), 328–352. <https://kerd.ku.ac.ke/handle/123456789/1424>
- Nachmias, C. & DeWaard, J. (2015). *Research methods in social science*. 8th Edition, Worth Publishers.
- Oduol, N.N. (2019). Effect of teachers' gender on teachers' perception towards information and communications technology (ICT) facilities in secondary schools. *International Journal of Innovation and Research in Educational Sciences*, 6(1). www.ijires.org/index.php/issues?view=publication&task
- Omboto, Charles and Kanga, Anne (2022). Examining teachers' ICT competency in teaching learners in special schools In Kenya. *European Journal of Special Education*.
- Rizkiani, R. (2022). Professional competency of pre-service English teachers and ICT during COVID-19 pandemic. *Acuity J. Engl. Lang. Pedagog. Lit. Cult.* 6, 138–147
- Samonte, K. & de Guzman, P. (2019). ICT competencies among public secondary school mapah teachers: an assessment. *JPAIR Institutional Research*, 12(1), 40–53. <https://doi.org/10.7719/irj.v12i1.743>
- Thai, H. L., Kim, T. D. T., Phuong, L. V., and Phuong, V. N. T. (2022). ICT competence of pre-service teachers in Vietnam: structure and impact model. *Journal of Educational and Social Research*, 12(3), 172. <https://doi.org/10.36941/jesr-2022-0076>
- Treceña, J. K. D. (2021). The digital transformation strategies of the Philippines from 1992 to 2022: A Review. *Eng. Technol. Rev*, 2, 8-13.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>