

# The Moderating Effect of Age and Length in Service on Information Communication Technology Competencies and Instructional Performance

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## Abstract

Teacher must inspire their learner to be more productive. Teachers who are motivated and productive in their endeavors ensure to play their role in uplifting learner ability. Thus, this study focused on determining the impact of ICT Competencies to Instructional Performance. The study utilized a descriptive-correlational design with the researcher-made online survey questionnaire as primary instrument in gathering the data needed. It was participated by the eleven schools with 150 selected teachers in San Francisco District, Division of San Pablo on S.Y. 2022-2023. The analysis of the data revealed that there is a positive significant relationship between technological ICT competencies and instructional performance of the teacher respondents. The result revealed that there is a positive significant relationship between pedagogical ICT competencies and instructional performance of the teacher respondents exist. Likewise, positive significant relationship between didactical ICT competencies and instructional performance of the teacher respondents. The result indicated that there is a positive significant relationship between social ICT competencies and instructional performance of the teacher respondents. Also the data shown that age and length of service of teachers does not moderate the ICT Competencies and Instructional Performance of a teacher. The study suggests that teacher needs to consider enhancing their ICT competencies which is a great help for their professional growth. It can be a powerful tool which they may use in captivating the learners' attention and motivation. It may identify their strengths and weaknesses to have rooms for improvement. Also, the age and length in service of a teacher does not define ICT Competencies and Instructional Performance of a teacher inside the classroom it implies that even you are new or traditional teacher it does not affect how the teacher perform and provide better learning to the learners.

*Keywords:* didactical; ICT competencies; instructional performance; pedagogical; social; technological

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## 1. Introduction

The COVID-19 pandemic has increased the need for educational resources on online ICT usage. Digital training is essential for students and teachers as technology becomes increasingly important in the workplace. Schools are pushed to implement technology-based activities in an uncontrolled environment, with new training and seminars tailored to meet specific demands. Information and communication technology is becoming a fundamental aspect of education worldwide, and teachers' choice, planning, and use of appropriate ICT instructional devices significantly impact the teaching and learning process. (Dúo-Terrón, et al. 2022).

According to Mwalongo, A. (2011). Access impacted how frequently ICTs were used, and training impacted how competently instructors used ICTs for teaching, administration, professional development, and personal usage.

However, rather than drastically altering their teaching techniques, teachers continued to use traditional methods while utilizing ICTs. A teacher's ICT Competencies can affect the role of instructors, students, curriculum, and education.

ICT is essential for quality education, enabling teachers and students to excel. Teachers must possess diverse ICT competencies to adapt to modern trends, introduce new methods, and continuously improve for lifelong learning. (Vitanova, et al. 2015).

The school must be considered in transforming education in the modern era and the teacher's competencies, background, age, gender and length of service and attitudes towards Information Communication Technology.

According to Tondeur et al. (2018), few studies aim to determine the connection between pre-service teachers' perceived ICT competencies, including their background (age, gender), attitudes towards ICT, and their technical assistance in ICT. It focuses on preparing future teachers to integrate ICT into limited or one-way strategies.

For instance, according to Mercado et al. (2019), the educational system must continuously improve to meet the challenges of the 21st century. These competencies are used to design science teacher education programs to help teachers become competent facilitators of learning and utilize technology effectively in classroom contexts.

ICT's accessibility and opportunities in the 21st-century influence education, leading to significant changes in organization and provision. Globalization has fundamentally changed how modern humans live and work, transforming how education is organized and provided. (Arinze, et al. 2012).

This confusion on the ICT Competencies of a teacher will greatly affect their instructional performance as it is designed for critical function in achieving the desired educational aim (Montilla et al., 2023). This will signify that the teacher can teach and learn effectively and efficiently and serves as an important role in the educative process.

## **2. Background of the Study**

According to Carroll & Conboy (2020), the COVID-19 pandemic has a huge connection teachers' work, with technology playing a crucial role in the workplace. Many schools have experienced a sudden shift from face-to-face to modular and online distance learning, requiring teachers to develop their Information Communication Technology (ICT) competencies. This challenge is particularly significant for long-term teachers who have mastered traditional chalk and blackboard methods. Learning new techniques requires courage, patience, and being cautious about using internet sites safely and legally (Panergayo & Aliazas, 2021). Teachers must also be willing to learn different technology usage, incorporate it into teaching, and understand its functions as an aid to their teaching.

ICT is crucial in education, serving as a means of communication and socialization. Countries are integrating ICT practices to provide quality education and prepare learners for the digital world (Fideli & Aliazas, 2022). Teachers are now required to conduct classes in non-traditional ways, and the current situation has led to uncertain transitions for both teachers and schools. Some schools have adapted synchronous and asynchronous learning methods, while others use offline and modular learning. Blended learning is also recommended based on various factors. (Aksal & Gazi 2015)

As cited by Ololube (2006), Integrating information and communication technology (ICT) is crucial for education worldwide, with teachers' selection, preparation, and usage of appropriate devices impacting the teaching and learning process. Governments have incorporated ICT into strategic planning and curricular documents, but the most important aspect is teachers' attitudes, competencies, and willingness to further education in ICT. Teachers must have adequate ICT

competencies to use ICT in their teaching and learning processes effectively. Both teachers' ICT competencies and their perception of their role in their teaching and learning processes play key roles in integrating ICT into education.

Instructional Performance are vital function that teachers perform to achieve the desired goal in education. This may imply that the teacher must have the potential for effective and efficient teaching and learning. Teachers' instructional performance is demonstrated in their professional ability through their professional growth development, which is essential to successful teaching. (Ayeni, 2018).

According to Yuldasheva (2021), teachers' ICT Competency is crucial for a tech-driven education, enhancing student interest and innovation. By utilizing advanced technology and personal understanding, teachers can improve instructional performance. However, limitations exist in implementing teaching strategies, such as resource availability, internet connectivity, mental health, and work-related issues. Exploring new and effective approaches is essential to meet the rapidly changing needs of learners.

According to Selvi (2010), Teachers must improve their skills, knowledge, and attitudes to improve their instructional performance in public elementary schools. Studies often focus on classroom work, neglecting the importance of teachers' abilities and competencies. This study aims to determine the effect of ICT competencies on teacher performance.

Throughout history, various teaching and communication methods have been introduced to enhance learning experiences. As the pandemic has accelerated, teachers increasingly rely on technology. Different learning modalities, such as online, modular, and blended learning, are being implemented to meet learners' needs. Online platforms like Google Classroom, Google Meet, MS Teams, and Zoom facilitate communication between learners, teachers, and parents. However, many teachers struggle to adapt to these new teaching methods, requiring technological, pedagogical, didactical, and social competencies.

There is the full operation of face-on-face classes, and teachers are still new to some changes in the educational system. That is why ICT competencies are designed to play a crucial role in reaching the desired educational goal, therefore, a teacher's instructional performance will be significantly influenced by this misconception. This will imply that the teacher can instruct students effectively and efficiently and plays a crucial part in the educational process. With this in mind, this concept sought to determine the impact of Teacher's ICT Competencies on Instructional Performance since these competencies must be developed to perform well in a given task.

### 3. Methodology

The study employed the descriptive and correlational research method in determining the relationship between Information Communication Technology Competencies and Instructional Performance of public elementary school teachers of San Francisco District. As cited by Salaria 2012, According to Dr. Y.P. Aggarwal, descriptive research is devoted to gathering information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts but includes proper analyses, interpretation, comparisons, and identification of trends and relationships.

This study was conducted among public elementary schools of San Francisco District, situated in the municipality of San Pablo, province of Laguna. The respondents were one hundred fifty (150) Grade 1 to Grade 6 public elementary school teachers who were chosen randomly, presently active in the service and currently connected with the eleven (11) public elementary schools in San Francisco District in 2022-2023. Most respondents were from Don Enrique Bautista Elementary School, which is 21. At the same time, the least were from Atisan Elementary School, which is 8.

This study employed random sampling technique in choosing the required number of respondents. It guaranteed that everyone in the eleven selected elementary school teachers in San Francisco District would have an equal chance of being chosen and selected as the respondents of the study.

The adapted research instrument was the primary instrument in gathering the data. The questionnaire was divided into three parts (respondent's profile, Information Communication Technology (ICT) competencies of teachers towards the use of technology, and instructional performance of teachers with regards to Information Communication Technology (ICT) Competencies in teaching). This method was used to simplify the data gathering.

#### 4. Result and Discussion

This chapter presents the gathered data and the results of the study as well as the interpretation of the data as a result of the statistical treatment used.

**Table 1.** Test of Relationship between Teachers' ICT Competencies and Instructional Performance

ICT Competencies	Instructional Performance					
	Delivery of Lessons	Evaluation of Learning Outcome	Classroom Management	Usage of Instructional Materials	Management of Resources	Providing Feedback
<b>Technological ICT Competencies</b>						
Basic Technology Operation	.555**	.581**	.439**	.505**	.548**	.343**
Personal Use of Technology Tools	.592**	.609**	.493**	.611**	.625**	.447**
Teaching of Technology	.639**	.607**	.561**	.621**	.647**	.542**
<b>Pedagogical ICT Competencies</b>						
Instructional Practices	.622**	.574**	.582**	.636**	.652**	.548**
Knowledge of the Curriculum	.614**	.625**	.568**	.574**	.610**	.483**
Techniques and Method	.708**	.708**	.589**	.671**	.706**	.552**
Nature of the Target Audience	.597**	.606**	.525**	.610**	.644**	.459**
Strategies for Evaluating Student Understanding	.640**	.594**	.432**	.579**	.622**	.392**
<b>Didactical ICT Competencies</b>						
Nature of the Subject knowledge	.659**	.619**	.478**	.598**	.647**	.417**
Inquiry in Different Fields	.723**	.687**	.627**	.675**	.692**	.556**
<b>Social ICT Competencies</b>						
Ethical Use	.772**	.714**	.663**	.711**	.729**	.592**
Legal Use	.740**	.738**	.663**	.737**	.711**	.657**
Safe Use	.729**	.737**	.676**	.730**	.700**	.689**

\*Correlation is significant at .01 level

These refer to the significant relationship of ICT Competencies of Teachers as to their Instructional Performance.

As indicated in the Table 1, there is a positive significant relationship between the Technological ICT Competencies and Instructional Performance of teacher-respondent. This implies that the ICT competencies of teachers would impact the instructional performance of teachers. ICT Competencies as a skill is being used by the teachers to teach learner can help learner to be engaged in doing their task inside the classroom. Teachers' effective ICT competencies motivate the learner to accomplish certain school tasks at their very best. Thus, the goals will be achieved if the teacher have the initiative in improving themselves in integrating ICT in nurturing their learner.

ICT has increased the significance of computer technology. It is possible to work more swiftly and efficiently on whatever one wishes. As a result of Internet and digital technologies are now possible thanks to computers and information technology. TVs, wireless technology, telemedicine, and many more things. The teaching will likely be carried out using cutting-edge teaching and learning techniques more successfully and effectively. Making use of the facility is now necessary. It enables a learner to access education at any time and location. The most effective choice for making things faster and better is communication technology. We must be aware. Applying the greatest technologies to practices for greater learning is what is required right now. (Kaware & Sain, 2015).

Similarly, a positive significant relationship was depicted between Pedagogical ICT Competencies and Instructional Performance of teacher. Teachers have the ability to effectively integrate technology into their teaching practices in order to enhance student learning outcomes. This includes a range of skills such as selecting appropriate technology tools and resources, designing and implementing technology-enhanced learning activities, and using technology to support student engagement, motivation, and assessment.

Effective pedagogical ICT competencies as to instructional performance require teachers to have a deep understanding of how technology can be used to support student learning, and to be able to apply this understanding in a practical and effective way. It also involves being able to use technology tools and resources in a way that is aligned with student learning goals and standards, and that supports diverse learning needs and styles.

Teachers can also evaluate the effectiveness of technology-enhanced learning activities and make adjustments and improvements based on student feedback and outcomes. It also involves staying current with emerging technologies and pedagogical practices and continuously developing and refining one's ICT skills and knowledge.

As cited by Angeli & Valanides (2009), when utilized properly, technology offers a wide range of pedagogical benefits and can significantly alter the teaching and learning environment. The question therefore becomes how to use technology to transform teaching and produce new learning possibilities rather than whether or not teachers should incorporate technology into their current methods.

Likewise, there is a positive and significant relationship among didactical ICT Competencies and Instructional performance with correlations ranging from .556 to .723 and .417 to .659, respectively. These results suggest that teachers who possess strong pedagogical and didactical ICT competencies are more likely to perform well in all areas of instructional performance.

And lastly, the highest correlation was found between social ICT competencies and instructional performance in all areas, with correlations ranging from .663 to .772. This suggests that teachers who demonstrate strong social ICT competencies are likelier to perform well in delivering lessons, evaluating learning outcomes, managing classrooms, using instructional materials, managing resources, and providing feedback. Because it is a way by which the teachers communicate with the learner.

According to Zhu et al. (2013), in his study, the results show a positive relationship between instructors' innovative teaching effectiveness and their technological, social, and educational competencies. According to the study, effective innovative teaching by instructors depends on having supportive relationships with their peers.

Table 2. Moderating Effect of Age on the Relationship between ICT and Instructional Performance

<b>Model</b>						
	<b>coeff</b>	<b>se</b>	<b>t</b>	<b>p</b>	<b>LLCI</b>	<b>ULCI</b>
Constant	4.5699	.0235	194.7828	.0000	4.5235	4.6162
ICT	.6933	.0451	15.3818	.0000	.6042	.7823
AGE	.0269	.0113	2.3709	.0191	.0045	.0493
Int_1	-.0157	.0236	-.6653	.5069	-.0623	.0309
<b>Model Summary</b>						
<b>R</b>	<b>R-sq</b>	<b>MSE</b>	<b>F</b>	<b>df1</b>	<b>df2</b>	<b>p</b>
.7890	.6226	.0775	80.2745	3.0000	146.0000	.0000

This table shows the results of a regression analysis examining the moderating effect of age on the relationship between ICT competencies and instructional performance. The model includes the constant, ICT competencies, age, and an interaction term (Int\_1).

The coefficient for ICT competencies is .6933, indicating that for every one-unit increase in ICT competencies, there is a .6933-unit increase in instructional performance. The coefficient for age is .0269, indicating that for every one-year increase in age, there is a .0269-unit increase in instructional performance. The interaction term is not significant ( $p = .5069$ ), suggesting that age does not moderate the relationship between ICT competencies and instructional performance.

The R-squared value of .6226 indicates that the model explains 62.26% of the variance in instructional performance. The overall model is significant ( $p < .0001$ ), indicating that ICT competencies and age are both significant predictors of instructional performance.

This may conclude that age is not a factor to consider when implementing ICT tools in educational settings. It only shows that even if teachers are young or old enough in terms of age they can perform well in classroom setting as needed.

Younger teachers may generally be more familiar with technology due to having grown up in the digital age. They may be more comfortable using ICT tools and integrating them into their teaching practices. However, this does not mean that older teachers cannot effectively use technology in the classroom. Many experienced teachers have embraced technology and successfully incorporated ICT tools into their lessons. They may have taken professional development courses or sought assistance to enhance their technological skills.

Information and communication technology (ICT) use in higher education has been the subject of extensive research, which has revealed a number of elements that influence how it is used in instruction. However, the impact of age on university lecturers' usage of ICT has gotten far less attention. The findings demonstrate that while there are some age-related gaps in instructors' personal ICT usage, age is not a determinant in the use of ICT in instruction. The research findings may help prepare for teacher assistance, training, and quality control at the university's ICT-supported teaching center. (Kerzic, et.al 2021).

Table 3. Moderating Effect of Length in Service on the Relationship between ICT and Instructional Performance

Model						
	coeff	se	t	p	LLCI	ULCI
Constant	4.5720	.0229	199.9374	.0000	4.5268	4.6172
ICT	.6807	.0436	15.6036	.0000	.5945	.7669
LENGTH IN SERVICE	.0327	.0124	2.6402	.0092	.0082	.0572
Int_1	-.0139	.0265	-.5257	.5999	-.0663	.0384
Model Summary						
R	R-sq	MSE	F	df1	df2	p
.7910	.6257	.0768	81.3706	3.0000	146.0000	.0000

This table presents the results of a statistical model examining the moderating effect of length in service on the relationship between ICT (information and communication technology) and instructional performance.

The model includes a constant term (4.5720) and two predictor variables: ICT (.6807) and length in service (.0327). The coefficient for ICT indicates that a one-unit increase in ICT is associated with a .6807-unit increase in instructional performance, holding length in service constant. The coefficient for length in service indicates that a one-unit increase in length in service is associated with a .0327-unit increase in instructional performance, holding ICT constant.

The interaction term Int\_1 (-.0139) is not significant ( $p=.5999$ ), suggesting that the relationship between ICT and instructional performance does not depend on the level of length in service.

The model explains a significant amount of variance in instructional performance ( $R\text{-sq} = .6257$ ,  $p < .0001$ ), with ICT and length in service together accounting for 62.57% of the variation in instructional performance.

Overall, the results suggest that both ICT and length in service are positively associated with instructional performance, but the relationship between ICT and instructional performance is not moderated by length in service. This may imply that the length of a teacher's service does not affect how teachers perform their duty. It only shows that even if you are a newly teacher or experienced teacher you can do your task efficiently and effectively.

For the experienced teachers they may have developed a deep understanding of their subject matter and gained insights into effective instructional strategies over time. They may have honed their classroom management skills, developed a repertoire of teaching approaches, and learned from their past experiences. Since we are in modern technology education experienced teachers continually seek professional growth and improvement to adapt to modern trend in teaching.

On the other hand, newly qualified teachers bring fresh perspectives, enthusiasm, and recent knowledge of teaching methodologies. They may have received training in the latest educational practices and have access to up-to-date research and resources. While they may lack the experience of managing various classroom situations or facing specific challenges, they can compensate for this through their willingness to learn, adapt, and collaborate with more experienced colleagues.

## 5. Conclusion and Recommendation

The findings of the study led to the formulation of the following conclusions:

1. Technological ICT Competencies were significantly related to instructional performance. Therefore, the hypothesis is not sustained.
2. Pedagogical ICT Competencies were significantly related to instructional performance. Therefore, the hypothesis is not sustained.
3. Didactical ICT Competencies were significantly related to instructional performance. Therefore, the hypothesis is not sustained.
4. Social ICT Competencies were significantly related to instructional performance. Therefore, the hypothesis is not sustained.
5. Age of teacher-respondents does not moderate the relationship between ICT and Instructional Performance. Therefore, the hypothesis is sustained.
6. Length in Service of teacher-respondents does not moderate the relationship between ICT and Instructional Performance. Therefore, the hypothesis is sustained.

In the light of the findings and conclusions of the study, the following recommendations are offered:

1. Teachers may consider attending seminars or workshop in doing hardware repairs and writing general program for them to have the knowledge on basic technology operation and personal use of technology.
2. Teacher may have a specific and standardize criteria or criterion in the evaluation of learning outcome of the students. Also, thru this criteria or criterion teacher may ensures fairness and consistency in assessing student performance.
3. Teachers may consider their strengths and weaknesses for some rooms for improvement. They may attend seminars where they are fully engaged in using technology in class and share what they have learned to their colleagues.
4. Teachers who can relate ICT competencies with instructional performance may motivate and make the learners perform better. Teachers may easily figure out the factors that facilitates the learning in its easiest approach.
5. A similar study may be conducted by future researchers to strengthen or deny the findings of this study. This study may also be used as a basis in exploring topics related to ICT competencies as to instructional performance in the local setting which is indeed important.

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