Research Article

Mastering Innovations in the Lens of Information and Communications Technology (ICT) Competence and Practices of 21st Century Filipino Teachers: A Comparison among Thailand, Vietnam, and the Philippines

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ABSTRACT

In the advent of Information and Communications Technology in education, competence and skills for technology-based instruction are essential for teachers. With this, there is a need to continually train and equip teachers with understanding and capabilities that will enable them to maximize the utilization of ICT in their instructional practices. Hence, this research determined the correlation of teachers' level of ICT competence towards their ICT integration practices and corroborated it to existing findings in Thailand and Vietnam. Using a descriptive-correlational design, the researchers found a link between and among variables. The chosen respondents for the study consisted of one-hundred and nineteen (119) teachers from private institutions in a district in Bulacan. Results showed that teachers exhibited competence towards ICT integration. More so, teachers highly practiced ICT integration as part of their instructional practices and strategies in teaching. Results of regression analysis of the data revealed that the six dimensions of ICT competence significantly correlated to the teachers' ICT integration practices. The pedagogical practices and competence of Filipino teachers are the same as the Thai and Vietnamese teachers towards ICT Integration. It is recommended that schools maintain teachers' competence and confidence towards ICT integration thru enhancement or faculty development programs.

Keywords: Information and Communications Technology (ICT), Competence, Practices, Filipino Teachers, Thailand, Vietnam

Introduction

The pace of globalization and advancement in Information and Communications Technology (ICT) has created an advanced digital era that brought a significant change in society and education. Information and

Communications Technology (ICT) have become essential in bringing a huge shift in education that empowers people to learn and acquire new skills and approaches and transform themselves to adopt the digital era (Caraig et al., 2020). The advent of ICT in education provides new possibilities to make the teaching and learning process more interactive and meaningful to the child's learning. The infusion of ICT in education exposes the need for ICT competence for our 21st century teachers. As ICT incorporation in education is increasing, teachers' expertise in utilizing teaching-learning modalities in the so-called multimedia classroom is of prime importance. The conceptualization of teachers' ICT competence helps them to become more productive and effective in the teaching and learning process (Perez & Delgado, 2019). To provide visibility to an education that stresses ICT infusion, a teacher can ensure and build their ICT skills to thoroughly implement ICT into the learning process and create new ways to strengthen the learning of students (Helleve, Grov Almas, & Bjorkelo, 2020).

With this advancement in education, most of the countries in Southeast Asia also subjected teachers' level of ICT competence and practices to studies, however, there were some gaps and issues about ICT integration encountered and experienced. In Thailand, ICT competence was identified as one of the deficiencies in the basic education system. Thus, Akarawang, Kidrakran, & Nuangchalerm (2015) investigated how they could enhance teachers' ICT competency in teaching. The study's findings revealed that teachers required training that is more focused on achieving better practical skills and understanding towards ICT. However, the current training they have does not adequately support the teachers' ICT competence and practices. To recommend guidelines for successful training, including proper needs assessments of teachers before training, development of interesting and useful training curriculum in association with teachers, and use of blended training methods. A follow-up study conducted by Akarawang, Kidrakran, & Nuangchalerm (2016), showed that Thai teachers' ICT competency is better after a series of training participated on by Thai teachers.

In Vietnam, the national government has been investing Information and Communications Technology (ICT) in education for several years. In fact, they learned that integrating ICT into the education setting may improve the students' competence in the market and their academic success. However, little is known about teachers' competence in an ICT integrated education (Hai, Thao, &Tinh, 2016). Furthermore, the study of Hai, Thao, & Tinh (2016) showed that there are Vietnamese in the Northern Highlands who had low ICT competence and the least practice of ICT integration. Peeraer & Van Petegem (2012) stated that the unbalanced operational planning on technology plans led to a gap between the current rhetoric in policy guidelines, vision statements of the institutions, and the reality in teaching practice. From the study by Nhu, Keong, and Wah (2018), it was found out that teachers' lack of ICT competence emerged as one of the issues and challenges of ICT integration in the school. Moreover, Nguyen (2016) reported that teachers' level of ICT competence was quite low. To meet the deficiency regarding teachers' ICT competence, the Ministry of Education and Training (MOET) recommended using ICT to enhance teaching-learning activities in the academe. Therefore, there have been paucity of studies on ICT integration at different educational levels and clear, unambiguous, and well-oriented policies that will further develop the teachers' competence for ICT integration (Tran et al., 2020).

In the Philippines, to complement the demand on technological uprising and the belief that it can bring about change, government educational institutions considered the incorporation of ICT in the teaching and learning process and the instructional and pedagogical practices of teachers. The incorporation of ICT plays significant role in enhancing learning in the world; since these tools can play a role in reforming education systems, increasing access to pedagogical resources, and improving the management of education and enhancing pedagogical technique (Kuyoro et al., 2012: Hero, 2019). On the other hand, Caluza et al.

(2017) explained that Filipino teachers, as to their competence, showed that they have basic knowledge on ICT; but needs improvement. Thus, more trainings are needed for teachers to fully integrate ICT in teaching and other related tasks assigned to them to uplift and enhance the quality of education. In contrast, Marcial and Rama (2015) stated that the present generation of teachers are more integrative, student-centered, and collaborative. However, only a slight technology infusion into teaching instruction among teachers was seen. In the study, there was still a need to improve teacher educators' level of competency, particularly skills in using complex and pervasive ICT tools to achieve innovative teaching and learning. For Tomaro (2018), several policy actions are recommended to fully integrate ICT in education in the Philippines, such as added training for teachers to further develop their ICT competence, provision of computer infrastructures, and integrate ICT in the curriculum in a strategized manner.

In general, there are still many countries in Asia that are in the process of improving the ICT competence and practices of their teachers to fully achieve the success of ICT integration in education. Therefore, it is the aim of the study to determine and assess the extent of ICT competence of Filipino teachers and its correlation with their ICT integration practices. The outcomes of the study will be corroborated with the results of other countries on the level of ICT competence of teachers, especially with Asian countries like Thailand and Vietnam, to develop a program development plan in line with the findings and current educational policies of these countries on ICT in education.

Purpose of the Study

This research determined the extent of ICT competence of teachers in private schools in one district of Bulacan, as well as its connection to their practices of ICT integration to represent the Philippine experience and corroborate this with that of Thailand and Vietnam. Since ICT is now adopted into teaching by most private schools, this research extrapolated the level of teacher competence and teaching practices in a technology-based curriculum. To come up with a well-written ICT program

development plan for the advancement of the outcome, the results of the analysis were corroborated with the research findings of Thailand and Vietnam. The results, therefore, served not only as a profound perspective, but also as a framework for program advancement that will further improve the ICT capabilities of teachers and unleash their full potentials as 21st century facilitators and catalyst.

Research Objectives

The study seeks to:
1. Determine the Teachers' level of ICT competence in terms of the following dimensions:
   1.1 information and data literacy;
   1.2 communication and collaboration;
   1.3 digital content creation;
   1.4 safety and security;
   1.5 problem solving; and,
   1.6 analyzing and reflecting?
2. Determine the ICT integration practices of teachers in terms of the teaching and learning tool domains.
3. Determine the correlation between the level of ICT competence of teachers to their ICT integration practices.
4. Corroborate the study findings with that of Thailand and Vietnam.
5. Propose a teachers' program development plan to further unleash the teachers' competence and capabilities towards ICT integration as it is corroborated with other research findings.

Methodology
Research Design

This study employed a descriptive correlation design to determine the relationship of teachers' ICT competence and their ICT integration practices of the Philippines represented by teachers from a district in Bulacan with that of Thailand and Vietnam. Correlational analysis is a tool for evaluating whether or not there is a relationship or correlation between and among variables, as well as the extent and degree of that relationship. The main data collection instrument used by the researchers was a standardized questionnaire. In addition, the study's variables were analyzed

and interpreted using a quantitative research approach.

Respondents of the Study

The study respondents included 119 private schools' teachers who are currently employed for this Academic Year and currently teaching thru online distance learning modality. The researchers utilized universal sampling procedure as the study's sampling technique since all of the teachers were the survey's chosen respondents. Both printed survey questionnaire and Google forms were distributed to gather the necessary data needed in the study. Informed consent was secured prior to their participation.

Instrument of the Study

To collect the data for this analysis, the researchers adopted and used a standardized questionnaire as the primary data collection tool. The survey-questionnaire for this study was divided into two sections, namely: teachers' level of Information and Communication Technology (ICT) competence and ICT integration practices. The first part of the survey-questionnaire is ICT competence. The researchers adopted the survey questionnaire, Basic ICT Competence Scale, from the study of Rubach & Lazarides (2020), which included the following dimensions: information and data literacy, communication and collaboration, digital content creation, safety and security; problem solving, and analyzing and reflecting. The scale is a 32-item questionnaire that measures teachers' level of ICT competence. The survey questionnaire was rated on a five-point Likert Scale ranging from 1 (not so competent) to 5 (highly competent). The Cronbach alpha values of the six dimension of basic ICT competence ranges from .72 to .93. Therefore, it is a reliable evidence given the overall Cronbach alpha value of 0.86.

To determine the ICT integration practices of the teachers, the researchers adopted the survey-questionnaire for ICT integration practices from the study of Hero (2020). The survey tool for ICT integration practices was patterned on Nueva's (2019) study and from the technology integration matrix of Florida's Center for Instructional Technology. Some indicators were modified as per recommendation by the field experts, who were district ICT coordinators in public schools, Master Teacher in TLE/ICT Department, and a school head, after its validation. The ICT integration practices questionnaire is composed of nine questions, five of which are for a teaching tool, and the remaining four are for learning tool.

Similar studies in Thailand and Vietnam were used to compare and corroborate the findings of the study in the Philippine setting.

Data Analysis

Using descriptive and inferential statistics, the researchers tabulated and interpreted the survey questionnaire results. To evaluate and interpret the results, the researchers used Statistical Packages for Social Sciences (SPSS) v. 24 as the study's statistical tools. Teachers' level of ICT competence, as the study's independent variable, and teachers' ICT integration practices, as the study's dependent variables, were quantified using descriptive statistics such as weighted mean procedures. On the other hand, to determine the correlation between the teachers' level of ICT competence and their ICT integration practices, the researchers utilized correlation and regression analysis.

To compare and corroborate the findings of the study with the findings of that of Thailand and Vietnam, regression analysis was utilized.

Ethical Consideration

To establish and safeguard ethics in conducting this study, ethical clearance was secured thru a local Research Ethics Committee of a private institution in the City of Malolos, Bulacan, Philippines. All respondents in the study signed an informed consent prior to their participation. Observance of all ethical principles was done during the conduct of the study. All researchers declared no conflict of interests in conducting this study.

Result and Discussion

Innovations utilizing ICT has truly become part of the paradigm shift in education especially at the start of this worldwide pandemic. ICT integration practices have been a subject of

academic researchers. Results from previous literatures showed that ICT brought changes from the conventional way of teaching the lesson to the current innovative way utilizing applications for integration and learning. This section would catechize and discuss the level of ICT competence and ICT integration practices of Filipino teachers and corroborate it with the researches from Thailand and Vietnam.

Table 1. Teachers' Level of Information and Communication (ICT) Competence

Teachers' Level of Information and Communication Technology (ICT) Competence	Average	Interpretation	Rank
1. Communication and Collaboration	4.03	Competent	1st
2. Analyzing and Reflecting	4.02	Competent	2nd
3. Digital Content Creation	4.01	Competent	3rd
4. Problem Solving	3.94	Competent	4th
5. Information and Data Literacy	3.93	Competent	5th
6. Safety and Security	3.92	Competent	6th
General Average	3.98	Competent	

Table 1 elucidates the level of Information and Communications Technology competence of teachers. In general, private school teachers exhibit competence in ICT integration in teaching, as evidenced by the general weighted mean value of 3.98. Moreover, analysis from the six domains of ICT competence shows that teachers are competent in communication and collaboration, analyzing and reflecting, digital content creation, problem-solving, information and data literacy, and safety and security with weighted mean values of 4.03, 4.02, 4.01, 3.94, 3.93, and 3.92 respectively.

It can be deduced on the summary of teachers' level of ICT competence in Table 1 that communication collaboration recorded the highest weighted mean value of 4.03, interpreted as competent. It reflects that teachers are competent in using digital media to communicate and share their experiences using digital media. They are also competent to actively participate in any social activities using digital media and apply behavioral rules in digital collaborations and interactions. In addition, teachers are adept and knowledgeable enough to use ICT to establish strong communication between them and their students in a digital media platform. They are also noted to be well-versed and competent on the different uses of ICT in communications and collaboration. With this, misunderstanding and miscommunication on the lesson utilizing digital media platform

may be avoided; since teachers are proficient in communicating and collaborating with their students.

Of the seven dimensions of teachers' level of ICT competence, safety and security was recorded the lowest with a weighted mean of 3.98; although still interpreted as competent. This means that teachers are still competent enough and fully aware of the hazards and breeches on safety and security in the use of digital platforms and on the use of ICT in instruction. Teachers are also mindful of the safeguards and laws to ensure safety, security and privacy of all stakeholders in the school which are part of the virtual teaching and learning environment. They are also knowledgeable of the security settings related to the learning management system used by the institution.

In the advent of a technology-driven instruction, the findings show that Filipino teachers are competent in integrating ICT into their instruction. They are able to navigate and use appropriate sources in a digital environment or a technology-based education which signifies that they are prepared and ready to fully utilize ICT in teaching. The findings reflect that Filipino teachers are competent to meet the international standards with respect to ICT integration.

Comparing these findings, Thai teachers' level of ICT competence is high given the series of trainings and programs that were

administered to Thai teachers as aid to their problems as to ICT integration (Achwarin, 2009). Similar findings from Nguenyuang, Busadee, & Rojsiraphisal (2017) articulated that skills and competence of Thai teachers' level of ICT integration are relatively good as supported by workshops enhancing their competence and outlook towards ICT integration.

Thai teachers are confident to improve the design and management of learning activities which focus on integrating technology into teaching and learning effectively. In Vietnam, Vietnamese teachers are generally skilled and competent to perform basic operations like word processing or creating electronic presentations (Peeraer & Van Petegem, 2010).

Table 2. Teacher's Information and Communications Technology (ICT) Practices

Teachers' Information and Communication Technology (ICT) Practices	Average	Interpretation	Rank
1. Learning Tool	4.02	Highly Practiced	1st
2. Teaching Tool	4.01	Highly Practiced	2nd
General Average	4.02	Highly Practiced	

Table 2 reiterates the Information and Communications Technology (ICT) practices of teachers. Teachers of the institution under study highly practiced ICT in their instruction, as shown by the general weighted mean value of 4.02. As seen on the table, ICT domains such as teaching tools and learning tools are described as highly practiced based on the computed weighted mean values of 4.02 and 4.01.

Based on the summary of the average mean in Table 2, it is clearly seen that learning tool recorded the highest weighted mean value of 4.02 in terms of the teachers' ICT practices. This implies that Filipino teachers are well-versed in infusing ICT into their teaching and instruction. They can develop learning tools to make the delivery of instruction more fruitful and effective for the learners. In addition, the use of ICT helps teachers in tracking their students' work and activities when utilizing the institutions' learning management system. Communication between teachers and students is also easily facilitated using ICT.

Though ranked second, teaching tool is still highly practiced by the teachers given the weighted mean value of 4.01, a little variance observed from the mean value of the learning tool. This shows that teachers do practice collaboration during online teaching and learning in order to engage and involve the learners. Based on the instrument used, this illustrates that the teachers are keen on accomplishing

their set educational goals set even in the virtual classroom. They also have a clear direction on how they will assign and achieve given tasks to meet the learning objectives. In addition, teachers exhibit flexibility and versatility in integrating ICT to deliver and disseminate needed information for the students' learning. Thus, proper communication and step-by-step procedures are also emphasized as part of the teachers' ICT instructional practices.

Overall, it can be postulated that teachers are now at the height of mastering ICT infusion as one of the innovations of teachers' instructional practices. ICT infusion was beneficial on the teachers' instructional practices as seen on the positive responses from the learners. Teachers in the 21st century, as demonstrated by the effective integration of ICT as their core teaching method, are now technologically equipped. Indeed, teachers in 21st-century education are updated on the current trends in instruction. Teachers have shown versatility and flexibility in integrating ICT in their teaching practices and strategies (Hero, 2020). In Thailand, ICT is an essential tool for teachers to keep them abreast of the societal changes and the digital age. Thus, innovative pedagogical practices with ICT infusion are major ways for the Thai teachers to survive the current educational system (Yi, 2014). Also, the infusion of ICT in pedagogical practices contributes to the enhancement of Thai teachers' teaching prac-

tices and students' skills, enabling them to apply their learnings in real-life situation (Sakulprasertsri, 2020). In Vietnam, Nguyen (2019) articulated that successful ICT integration in teaching and learning required the readiness of teachers and students and the pedagogy to use technology in the process.

Thus, Lê & Võ (2014) suggested that to further support the successful ICT integration into teaching practices, policy makers and educational administrators should support and encourage their teachers to utilize ICT in their teaching practices and be more aware of possible drawbacks of using ICT in teaching.

Table 3. Regression Analysis on Teachers' Level of ICT Competence and Practices

Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.37	0.347	-	6.829	.000
Information and Data Literacy	0.244	0.127	0.504	1.920	0.004*
Communication and Collaboration	0.360	0.272	0.915	1.325	0.194
Digital Content Creation	0.016	0.247	0.521	0.066	0.000*
Safety and Security	0.334	0.191	0.055	1.745	0.090
Problem Solving	0.328	0.152	0.017	2.150	0.039
Analyzing and Reflecting	0.101	0.239	0.489	0.006	0.002*
R-squared = 0.163					
F-value = 22.797					
p-value = 0.000					
alpha = 0.05					

In the course of investigation, the study hypothesized that the Information and Communications Technology (ICT) competence of teachers have no significant impact on their ICT pedagogical practices. The data collected were subjected to regression analysis to determine the extent of correlation of the independent variable to dependent variable.

As can be gleaned from the results of the regression analysis in Table 3, it reveals that all the six dimensions of Information and Communications Technology (ICT) competence of teachers are correlated to their ICT practices in a varying extent as shown by non-zero B coefficients. The nature of correlation is positive as can be gleaned on the B coefficients; which means that the better the teachers become competent in ICT integration in teaching, the better their pedagogical practices. Conversely, the least competence exhibited by the teachers, the least effect on their pedagogical practices.

Look closely at the obtained coefficients, it can be deduced that of the six dimensions of

ICT competence, three dimensions, namely, information and data literacy, digital content creation, and analyzing and reflecting correlated significantly with the ICT integration practices of teachers having been recorded with B coefficients, 0.244, 0.016, and 0.101 respectively, with associated probability less than the significance level set at 0.05. The three other dimensions of ICT competence such as communication and collaboration, safety and security, and problem solving with B coefficients of 0.360, 0.334, and 0.328 respectively correlated with ICT integration practices; but not to a significantly given the associated probability that exceeds the 0.05 alpha.

Further analysis of regression shown that for each unit increase in information and data literacy, communication and collaboration, digital content creation, safety and security, problem solving, and analyzing and reflecting, ICT integration practices could generate an increase of 0.504, 0.915, 0.521, 0.055, 0.017, and 0.489 respectively. Analysis of the obtained

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Beta coefficients indicated that of the six domains of ICT competence, information and data literacy, digital content and creation, and analyzing and reflecting were the best predictors of ICT integration practices.

The findings of the analysis of variance of the regression of teachers' ICT competence on their ICT integration practices revealed an F-value of 22.797 with the associated probability of 0.000. Since the associated probability does not exceeds alpha, this means that collectively the six dimensions of ICT competence affect the ICT integration practices of teachers; but the best predictors are information and digital literacy, digital content and creation, and analyzing and reflecting. Therefore, the null hypothesis, stating that the Information and Communications Technology (ICT) competence of teachers have no significant impact to their ICT integration practices, could be rejected.

These findings illustrate that teachers are competent toward ICT integration which reflects on their ICT integration practices making them more productive and efficient in their teaching. Also, the instructional practice with ICT infusion is highly practiced since they have shown competence by utilizing ICT in teaching effectively. The competence of teachers towards ICT integration transforms their instructional practices into an interactive and innovative one which fit the present population of learners who have been described as tech-savvy, creative and very visual. Thus, it creates the classroom that is more on a learner-centered and transforms the teacher to a facilitator and innovator. Findings from Merillo & Domingo (2019) showed that teachers strongly agree that they become more effective in the instructional process if they totally infuse ICT in teaching. It also improves the instructional practices for the betterment of students' learning. Similar findings were observed with studies done in Vietnam and Thailand.

Nguyen (2019) articulated that ICT competence of teachers influence most their teaching practices and can improve their teaching styles in a digital learning environment. Tran et al. (2020) also claimed that Vietnamese teacher skills and competence are good in a technology-based education and it reflects on the improvement on their pedagogical skills in teaching. On the other hand, findings of Weerakanto (2019) showed that Thai teachers were not confident in integrating digital technologies in teaching; but they believe on the potential on the use of technology in education. With this, there are still many countries, especially in Southeast Asia that are still in the process of mastering the incorporation and utilization of ICT in education as part of instructional and pedagogical innovation.

Proposed Action Plan

Table 4 presents the proposed enhancement program plan to maintain the teachers' level of competence towards ICT integration. The crafted enhancement program was based from the survey conducted by the researchers.

Table 4. Enhancement Program for Teachers in the Digital Environment

Topic	Objectives	Persons Involved	Expected Output
Designing and Conducting a Safe and Secured Virtual Classroom	1. Orient the teachers about the dangers and risks of a digital environment/virtual classroom; 2. Assess the level of understanding of teachers about cyber safety and security; 3. Guide the teachers on the safety and security procedures in a digital learning environment.	School administrators, Faculty	At least 95% of the will become aware of the different techniques that will ensure their safety and security in the digital learning environment.

Topic	Objectives	Persons Involved	Expected Output
ICT Integration in the Teaching and Learning Process	1. Discuss the different practices and techniques about ICT integration in the teaching and learning process; 2. Identify the different resources on ICT integration in teaching and learning process; 3. Promote interaction with the learners as an application of effective ICT integration; 4. Apply ICT in teaching demonstration and communication.	Faculty	At least 95% of the participants will be able to integrate ICT in the learning process.
Digitally Meant to be! Programs and Application Software in Learning	1. Identify, enumerate, and discuss the different programs and software that can be used in the learning process; 2. Apply this software programs and application in the teaching and learning process; 3. Guide the teachers on the successful use of different programs and application in the learning process.	Faculty	At least 95% of the participants will be familiarized with the different programs and software applications that can be used in teaching and learning process.
Who are you? Sources and Strategies in Digital Environment	1. Identify, familiarize, and discuss the different sources that can be used in a digital environment; 2. Discuss the different search strategies that can be applied in a digital environment; 3. Familiarize with the procedures for storing and retrieving information from different digital environment; 4. Apply the different sources and strategies in making a lesson for the students.	School administrators, Faculty	At least 95% of the participants will be able to apply and be familiarized with the different sources that can be used in the learning process and demonstrate a clear understanding of the different strategies that can be used in a digital learning environment.

Conclusion

Based on the objectives raised in this study and from the findings presented, this study concluded that Filipino teachers in the 21st century are competent in ICT integration in teaching and they highly practiced the ICT as their instructional practices. Also, it is found out that the level of ICT competence of teachers significantly correlated to their ICT integration practices. Corroboration from the studies in Thailand and Vietnam, Filipino, Thai, And Vietnamese teachers are at the height of mastering ICT integration in teaching as their innovation in instructional practices. As the outcome of the study, an enhancement program for the teachers is proposed to sustain the level of competence and practices of teachers in ICT integration.

Recommendations

The study recommends for an enhancement and training program focused on the safety and security domain of ICT integration. This is to strengthen the knowledge and understanding of teachers about the security and protection of teachers and learners in a digital learning environment. This can be included to their professional development program that is

regularly conducted before the start of each academic year. In addition, teachers may utilize other ICT resources to widen their understanding about the safety and security of using ICT in teaching. Enhancement programs may maintain and improve the competence and practices of teachers towards ICT integration. This enhancement program can be included in the in-service training of teachers, most especially at this time where majority of the school are utilizing online distance learning modality. Future researchers, who may be interested in the same parameter of the study, may undertake a similar study to determine the level of competence and practices of teachers towards ICT.

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