ICT Competency Level of Selected Public High School Teachers in Valenzuela City: Basis for the Development of an Enhanced ICT Training Program

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Abstract — Information and Communication Technology (ICT) is being utilized in education as it is believed to be an effective means in providing wide access of new pedagogy to teachers. In fact, several studies attempt to identify the impact of teacher's ICT competence towards effective instructional delivery of the lesson content to students.

This research examines the impact of ICT Competence based on the two widely used contexts for ICT integration into teaching, UNESCO ICFT-CFT and TPACK frameworks on the profile and performance of teachers.

A sample of 127 Public High School teachers from the classified mega public schools of Congressional District I and II of Valenzuela City, Metro Manila, Philippines, was selected using a Descriptive Comparative Research Method. Descriptive and inferential statistics were used to analyze the data obtained by a modified instrument. The findings revealed that teachers self-perceived themselves as "Proficient Teacher" with regards to their teaching performance based on the specified PPST strands. Moreover, teachers' ICT competence has acquired the "Knowledge Deepening Level" based on the standards set by UNESCO ICT-CFT, and "Agree" on the statements indicated in TPACK that imply their ICT competency level. Furthermore, teachers' ICT Competency Level was found to have no significant difference on years of teaching experience, present position, highest educational attainment, access to the Internet, and technology resources. Meanwhile, the study was found to have significant difference between ICT Competency level based on UNESCO ICT-CFT Standards and teaching performance, and ICT Competency level based on TPACK Indicators and teaching performance. After the study, implications of these results on teacher performance and learning development were discussed.

Lastly, an Enhanced ICT Training Program was developed for teachers' learning and development on various tools and technologies to be used in teaching with ICT integration which incorporates the content knowledge within and across curriculum teaching areas, and assessment designing and utilizing in the classroom.

I. Introduction

March 12, 2020, marked the declaration of the World Health Organization (WHO) that the Coronavirus Disease 2019 (COVID-19) is a global pandemic which took many lives and created a massive effect on the health and safety of people throughout the globe. The challenges brought by this pandemic to educational systems in different countries led to the implementation of some forms of remote learning. The summary report released by the United Nations Educational, Scientific and Cultural Organization (UNESCO) based on the result of an online survey conducted in April 2020, 64% of education systems revealed that their teachers did not possess the necessary abilities to support remote learning. Additionally, nearly 40% of the respondents stated that the difficulties teachers face is caused by a lack of time for them to prepare for home learning, particularly online learning.

In the Philippines, the COVID-19 pandemic emphasized the ICT training needs of teachers because distance learning (Palatovska et al., 2021) uses virtual platforms as their primary source in teaching. To sustain education and ensure learning continuity among students despite the pandemic, the Department of Education implemented the distance learning modality as shown in the development of the Basic Education Learning Continuity Plan (BE-LCP). This sudden shift in learning modality significantly impacts basic education as we face critical challenges in line with distance learning technologies. Moreover, this drives teachers to respond quickly to the demanding ICT skills needed for effective instructional delivery.

Given the issues pertaining to the needs of teachers on ICT training, an article was published by the International Energy Research Centre (IERC) last April 2020 about the Teacher Professional Development in the Philippines regarding ICT in education, a survey was done to find out how the Philippine educational system now handles Teacher Professional Development (TPD) on ICT integration. The lack of a national ICT strategy or policy, the absence of professional standards for technology in education among teachers, the ineffectiveness of the TPD framework for technology integration, and the Philippine Professional Standards for Teachers (PPST) performance indicator that includes "Positive use of ICT" under the "Content Knowledge and Pedagogy" domain as well as a strand on "Curriculum and Planning" that refers to teaching and learning resources including ICT, are some of the issues discussed.

In Valenzuela City, the local government distributed over 4,000 units of laptops to teachers in July 2022 to address the need for technological resources of teachers in teaching with technology integration, especially in blended learning modality. The pre-installed web-based software VCGuroAko is included with the laptops and was created to boost teachers' efficiency through collaborative use of all the required resources. The designed portal was thought to solve the problems of teachers in facing new normal education (Morata Jr., 2022, Valenzuela City News) but as of today, teachers' training on the use of the said portal is not yet conducted in schools. Moreover, the Valenzuela live streaming program through which instructional delivery was delivered by selected subject teachers via FB live was conducted during the new normal setup for

students to catch up with the lessons, however, training on how teachers can effectively and positively use ICT to be incorporated in their lesson delivery online, as teaching and learning resource, or via virtual platforms was not conducted.

No study to date has examined the links between teachers' ICT competence based on both ICT standards: TPACK and UNESCO-ICT CFT and their teaching performance that is based on the Philippine Professional Standards for Teachers. For this reason, the researcher tried to determine the ICT competence of teachers based on TPACK indicators and UNESCO ICT-CFT standards and find out which of these indicators can be improved that will help teachers develop their teaching performance. This paper gives emphasis on the importance of continuous learning and development of ICT competence to be utilized in teaching. Correspondingly, a study of how teachers, as the implementers and adapters of the curriculum (Alek et. al, 2021), should keep pace with the growth of technology can be conducted which can be the basis to develop an appropriate and enhanced ICT training program to support teachers for their continuous ICT upskilling and reskilling (Johnson, 2021).

Objective of the Study

The objective of this study was to determine the ICT competence of teachers based on TPACK indicators and UNESCO ICT-CFT standards during the school year 2022-2023 and find out which of these indicators can be improved that will help teachers develop their teaching performance.

II. Methodology

Research Design

The researcher employed quantitative research type in this study for data collection, analysis, and reporting. Furthermore, the researcher used descriptive-comparative research design. According to Cantrell (2011), the goal of a descriptive-comparative study design is to describe differences between groups without manipulation. For this study, one variable was considered in a population which is not manipulated and that includes ICT competency level of teachers.

Population and Sample of the Study

The population of the study were 805 public high school teachers from five (5) classified Mega Schools in Congressional District I and II, Valenzuela City, Philippines. The respondents are public high school teachers since the researcher is currently teaching in a public high school in Valenzuela City. Data below displays the number of teachers in each mega school, specifically, the teacher-respondents.

Number of teachers and public high school teachers in classified
Mega public high schools in Congressional District I and II

Schools	Total Number of Teachers	Number of Teacher-Respondents
1	141	26
2	169	26
3	144	25
4	186	25
5	165	25
TOTAL: 5 schools	805 Teachers	127 Teacher-Respondents

Instrumentation

For this study, a survey research method was used. One survey questionnaire was administered to gather data from each teacher-respondent. The survey questionnaire is divided into three (3) parts. The first part of the assessment is the demographic profile of teachers including internet access and technology resources. The second part consists of two domains: (1) UNESCO ICT-CFT Standards and (2) TPACK Indicators. The first domain includes six questions on teachers' understanding of ICT based on UNESCO's ICT Competency Standards for Teachers. This is a survey questionnaire developed by Marcial (2015) and was modified by the researcher. The six items in this domain were prepared as questions in which respondents will use a 4- point Likert scale anchored as 0 – Not Aware At All, 1 – Knowledge Acquisition Level, 2- Knowledge Deepening Level, and 3 – Knowledge Creation Level in rating their competency skills in the following areas: (1) ICT in education, (2) Curriculum and Assessment, (3) Teaching Pedagogy, (4) Tools and Technology, (5) Organization and Administration, and (6) Teaching Professional Learning. This has been used and modified by the researcher because it was found to be suitable to the objective of the study.

The second domain contained statements pertaining to their level of competency in terms of their Technological Pedagogical and Content Knowledge (TPACK). The indicators in the TPACK.xs questionnaire in determining the ICT Competency level of teachers were developed by Schmidt et. al. (2020). The researcher modified the questionnaire and included only those statements pertaining to technology as used in the classroom environment namely: Technological Knowledge (TK), Technological Content Knowledge (TCK), and Technological Pedagogical and Content Knowledge (TPCK).

The third part contained career stages as indicators in rating their teaching performance. This part is rating the teachers' self-perceived teaching performance involving the utilization of ICT based on the specified PPST Strands, namely: PPST Strand 1.1: Content Knowledge and its Application within and across Curriculum Teaching Areas, PPST Strand 1.3: Positive Use of ICT, PPST Strand 1.5: Strategies for Developing Critical and Creative Thinking, as well as other Higher-Order Thinking Skills, PPST Strand 2.3: Management of Classroom Structure and Activities, PPST Strand 4.1: Planning and Management of Teaching and Learning Process, PPST Strand 4.5: Teaching and Learning Resources including ICT, and PPST Strand 5.1: Design,

Selection, Organization and Utilization of Assessment Strategies. This survey questionnaire was made by the researcher to suit the purpose and needs of the study.

Testing for consistency, stability, and reliability was done on the survey instrument. It was pilot tested to 21 secondary teachers who were not included as respondents of the study and three specialists in the fields of education and ICT reviewed and verified the study instrument in addition to using statistical methods to determine its reliability. The data collected were assessed using Cronbach Alpha which resulted to 1.15 internal consistency for Part II Domain I consisting of questions based on UNESCO ICT-CFT standards in measuring ICT competence of teachers, 1.13 internal consistency for Part II Domain II which includes statements with level of agreement on teachers' ICT competence based on TPACK, and 1.12 internal consistency for Part III of the survey instrument which contains statements in rating teachers' self-perceived teaching performance based on specified strands. A total of 0.94 overall internal consistency was the result of reliability testing on the survey instrument using Cronbach Alpha.

III. Results and Discussion

Table 1
Difference between Teacher-Respondents' Demographic Profile and ICT Competency Level

Profile	F-computed value	F-critical value	Decision	Remarks
Years of Teaching Experience	0.43	1.28	Do not Reject	Not Significant
Present Position	0.44	1.28	Do not Reject	Not Significant
Highest Educational Attainment	0.45	1.28	Do not Reject	Not Significant
Access to the Internet	0.78	1.28	Do not Reject	Not Significant
Technology Resources	0.80	1.28	Do not Reject	Not Significant

As reflected in table 1, the F-computed values of the demographic profile of teacher-respondents which resulted to 0.43, 0.44, 0.45, 0.78, and 0.80 were less than the F-critical value 1.28 at 0.05 alpha level of significance two tailed test, respectively. Therefore, the results suggest not to reject the null hypothesis. These results imply that there is no significant difference between the demographic profile in terms of years of teaching experience, present position, highest educational attainment, access to the Internet, and technology resources and ICT competency level of the teacher-respondents.

Table 2

Difference between Teacher-Respondents' ICT Competency Level based on UNESCO ICT-CFT Standards and Teachers' Performance based on specified PPST Strands

	z-computed value	z-tabular value	Decision	Remarks
UNESCO ICT-CFT Standards vs. Teachers' Performance	5.18	1.96	Reject	Significant

The data on table 2 shows that the z computed value of 5.18 is greater than the z tabular value of 1.96 at 0.05 alpha level of significance two tailed test therefore, the null hypothesis is rejected. The result implies that there is a significant difference between ICT competency level based on UNESCO ICT-CFT Standards and teaching performance based on specified PPST Strands of teacher-respondents.

Table 3

Difference between Teacher Respondents' ICT Competency Level based on TPACK indicators and Teachers' Performance based on specified PPST Strands

	z-computed value	z-tabular value	Decision	Remarks
TPACK Indicators vs. Teachers' Performance	12.43	1.96	Reject	Significant

The data in table 3 shows that the z computed value of 12.43 is greater than the z tabular value of 1.96 at 0.05 alpha level of significance two tailed test therefore, the null hypothesis is rejected. The result implies that there is a significant difference between ICT competency level based on TPACK indicators and teaching performance based on specified PPST Strands of teacher-respondents.

IV. Conclusion

The following conclusions are drawn from the findings listed above:

1. Since teachers I-III positions dominate the teacher-respondents in this study, it is not surprising that they have self-perceived their teaching performance as proficient teachers for in the current RPMS standards, Teachers I-III were categorized as Proficient Teachers. On the other hand, in determining their ICT competency level, teacher-respondents were found to have a deeper knowledge of both ICT competency standards used by the researcher. This is probably due to their exposure to digital tools used in teaching which

happened during the distance learning modality and the COVID-19 pandemic has given teachers the opportunity to be familiar with ICT (Pozo et. al., 2021).

2. It is notable that most of the teacher-respondents have more than ten (10) years of teaching experience and are considered experienced teachers but were in Teacher I-III present positions and generally perceived themselves as proficient teachers rather than highly proficient ones. This might be because teaching experience as defined in this study includes the years they stayed as teachers in private schools and entered into public schools years after. Moreover, for a teacher to be highly proficient, he or she should model exemplary practice as a Master Teacher I, II, III, or IV as described in the current RPMS Tool for Highly Proficient Teachers.

3. Most of the teacher-respondents have obtained a bachelor's degree with M.A. units. The results revealed that teachers are pursuing their masters for professional development and have assessed themselves to have deep knowledge in terms of their TPACK and UNESCO ICT-CFT competence. This result implies that teachers who are pursuing their masters have sufficient ICT competence. As stated in an online community of teachers' website, the teacherph, Llego (n.d.), master's degree provides teachers with in-depth technical knowledge of their chosen field.

4. Teachers have sufficient internet access and technology resources. This might be due to the distributed VCGuroAko laptops from the local government and the connectivity assistance given by DepEd in the year 2021 through Sim Cards with 34GB connectivity load. Given these resources, it can be concluded that teachers have equipped themselves with ICT tools which help them integrate technology into teaching and use this in the teaching and learning process since the implementation of the distance learning modality up until today.

5. The results revealed that the ICT competence of teachers is sufficient as well as their teaching performance. However, their ICT competence in terms of tools and technology and knowledge of many different technologies and technical skills needed acquired the lowest means. This implies that teachers have obtained adequate ICT competence but have quite basic knowledge in utilizing it in their teaching particularly, in the PPST strands of content knowledge and its application within and/or across curriculum teaching areas and in the design, selection, organization, and utilization of assessment strategies which too have acquired the lowest means in their teaching performance.

6. Considering the data gathered such as teachers' internet access at home, school or via computer and mobile device and technology resources such as laptop computer and smartphone, these available resources are the basic tools necessary to conduct an enhanced ICT training program for learning and development of teachers.

7. Teachers, especially those teaching more than ten years, and have current teacher I-III positions should be helped and supported to advance their career stage from proficient to highly proficient or distinguished teachers through a PPST-based training.

8. These results suggest that teachers should have enhanced learning and development training on ICT that can be drawn from the lowest means obtained based on the UNESCO ICT-CFT and TPACK models and associate these trainings to the lowest means in their teaching performance based on the specified PPST strands to advance their ICT competence as well as their career stage and teaching performance.

V. Recommendations

From the findings and conclusions drawn, the following recommendations are suggested:

1. To determine the ICT competency level of teachers, an ICT assessment tool can be developed so that, specific ICT training needs will be addressed.

2. Standardized ICT Competency tools and ICT Capacity Building Workshop/Training should be created which can be associated with the Philippine Professional Standards for Teachers. These tools should be modified and improved over time, depending on the profile, technology resources, and situation of teachers. Furthermore, these tools can be the basis to conduct a continuous ICT training program and/or learning and development programs.

3. Since technology is continuously evolving, ICT training programs should be a continuing activity for teachers. Relevant topics regarding subject-specific technology integration should be included in the In-Service Training program or Learning Action Cell Sessions of teachers.

4. The Department of Education may also craft a separate policy regarding ICT integration in the classroom to clearly set objectives and standards which may enhance the performance of teachers in the 21st century teaching and learning.

5. The lack of significant associations between ICT Competency level and teaching performance in this study suggests other aspects that were not investigated. Future studies may fill in these gaps to obtain more accurate information regarding technology, digital competency, and ICT integration in education.

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