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Technological Pedagogical and Content Knowledge (TPACK) of Teachers in Relation to the Context and Their Teaching Performance, Loon, Bohol

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ABSTRACT

The Technological Pedagogical and Content Knowledge (TPACK) framework, developed by Mishra & Koehler, provide relevant and comprehensive knowledge necessary for 21st-century and technology-oriented teaching. This study chiefly intends to determine the TPACK level in relation to the context and their teaching performance. This study utilized a quantitative-correlational method using a survey research design to gather the TPACK and context levels; and a documentary analysis of the Individual Performance Commitment and Review Form (IPCRF), the school year 2019-2020, to gather the teaching performance. The respondents of the study were the teachers from the public secondary school of Loon, Bohol, with 90 teachers as the sample. The researcher complied with the Research Ethics Committee's requirements to guarantee the proper observation of the research ethics protocol. Results showed that the teacher respondents had a very high level of TPACK and a very satisfactory teaching performance. The respondents also rated their context with a very high level. In the further analysis of the gathered results, findings revealed that the respondents' TPACK had a significant relationship to the context, but none to the teaching performance. It also showed that the respondents' context and teaching performance had insignificant relationship.

Keywords: TPACK, Context, Teaching Performance, quantitative-correlational method, Spearman Rank Correlation, Bohol, Philippines

INTRODUCTION

In the 21st century, society firmly demanded every individual to acquire modernized and relevant skills for global competition. It even paved the way for initiating a significant reformation of the education system in the Philippines. However, the nation should consider the teacher's quality to realize society's demands and the K to 12 curriculum program's effectiveness.

Information and Communication Technology (ICT) is at the core of 21st-century skills (Voogt & Roblin, 2010). Hence, teachers must know both the technology and the implementation to meet the educational goals (DeCoito & Richardson, 2018). However, majority of the teachers nowadays are *digital immigrants* teaching and interacting with *digital native* learners (Macale & Quimbo, 2019). Generally, this supports the fact that many teachers have not embraced and integrated the technology as they are still preoccupied with the traditional idea of the teaching (Agustini, Santyasa, & Ratminingsih, 2019). Further, even though it is highly observed that teachers use various technologies, they still failed to integrate ICT in teaching to reinforce active learning among students (Ertmer & Ottenbreit-Leftwich, 2013). In the Philippine context, a study reported that though the teachers are familiar with the pedagogical operations of ICT, they have no experience in implementing it in their instruction (Marcial, 2015). In this perspective, the Technological Pedagogical and Content Knowledge (TPACK) framework, developed by Mishra and Koehler (2006), has gained popularity in solving the undying issues of the effective technology integration in instruction.

The central emphasis of the TPACK framework is the complex interaction of the three bodies of knowledge, playing out across diverse contexts, instead of treating them solely in isolation (Mishra & Koehler, 2006, 2008). It presents an innovative framework to describe teachers' understanding of designing, implementing, and evaluating curriculum and instruction with technology (Niess, 2011). Further, this framework provides the integrative and transformative knowledge needed to effectively apply ICT in classrooms (Chai, Koh, & Tsai, 2013).

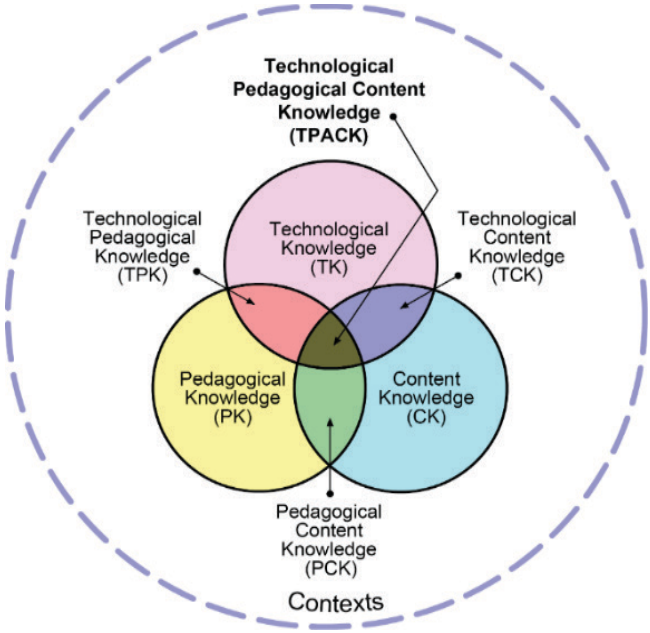

Figure 1. TPACK Framework
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Figure 1 shows the TPACK framework which has seven (7) knowledge components. These knowledge components are briefly discussed as follows (adapted from Mishra & Koehler, 2006; Koehler & Mishra, 2009)

Furthermore, the framework emphasizes the crucial role of context to TPACK. However, only a limited number of researches contribute to this matter. With that said, Porras-Hernández & Salinas-Amescua (2013) and Rosenberg & Koehler (2015) recommended including the context in future studies.

The framework of Rosenberg & Koehler (2015) in figure 2 shows that context is disaggregated along into two essential dimensions: scope and actors. Echoing the advanced framework of Porras-Hernández & Salinas-Amescua (2013) after recognizing its important contribution, Rosenberg & Koehler (2015) cited that these dimensions are factors and characteristics that reciprocally affect the teachers' TPACK.

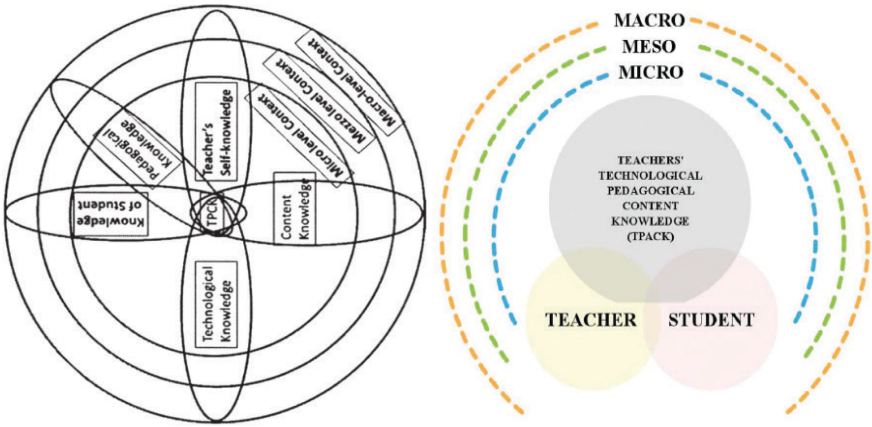

Figure 2. Frameworks for Context in TPACK
From Porras-Hernández & Salinas-Amescua, 2013 (left);
Rosenberg & Koehler, 2015 (right)

The scope was further categorized, through Bronfenbrenner's ecological developmental model, into micro, meso, and macro contexts. Micro context covers the conditions for learning that occur in class (e.g., available resources for learning activities, policies, expectations, beliefs, goals of teachers and students as they interact). Meso context comprises those in the school and the accessibility of support staff. Macro context encompasses the wide-ranging conditions (e.g., implemented national curriculum) that affect the teaching-learning process and the development of students and teachers. (Porras-Hernández & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015)

On the other hand, actors include the teachers and students, the main actors in most educational processes (Porras-Hernández & Salinas-Amescua, 2013). As distinguished, teacher factors cover all the teachers' attributes (e.g., motivation, self-efficacy, except their TPACK) while student factors include all students' characteristics (Rosenberg & Koehler, 2015).

Knowledge is necessary for good teaching (Shulman, 1987) as it becomes the basis and foundation of the teacher on his or her actions and practices (Schön, 1983 cited by Da Ponte & Chapman, 2006), which will then define their teaching performance (Darling-Hammond, 2010). In the Philippines, the Department of Education (DepEd) established and

implemented the Results-Based Performance Management System (RPMS) to ensure efficient, up-to-date, and quality performance. RPMS is aligned with the Philippine Professional Standards for Teachers (PPST). DepEd has been guided that teachers play a crucial role in improving teaching and learning quality, which urged the agency to put teacher quality development as the top priority in the Philippine educational reform efforts toward quality education. Recognizing the changes that occurred in the national (K to 12 Reform) and global (ASEAN integration, globalization, changing character of 21st-century learners) frameworks, DepEd called for reconsidering and improving the teacher competencies through the development of the PPST. Hence, the RPMS was not built just to add a burden on the teachers and school heads due to excessive paper works it requires (as alleged by Alliance of Concerned Teachers cited by Merlina Hernando-Malipot, 2019 in Manila Bulletin) but to encourage them to acquire, apply, and develop those standards stipulated in the PPST for improved quality education.

The identification, acquisition, and development of TPACK among teachers can provide support in realizing the implications of some technology-based teaching and learning theories. Engagement Theory (Kearsley & Shneiderman, 1998) mainly articulates that learner must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks with technology's facilitation to increase motivation. Additionally, it represents a model for learning and teaching in the information and digital age, emphasizing the positive role that technology can contribute.

Furthermore, Anchored Instruction Theory (Bransford, Sherwood, Hasselbring, Kinzer & Williams, 1990) identified the world's real life as the essential content in technology-integrated teaching. It implies that learners employ the reality of the living world as the chief subject matter to discover problems, generate questions, and solve the problems. Guided with this theory in the instruction, learners can obtain a mastery of learning on wide-ranging content knowledge and skills (Ouyang & Stanley, 2014).

Meanwhile, teachers' TPACK is situated and grounded and can be affected by specific contexts (Mishra & Koehler, 2006, 2008; Koehler, Mishra, Kereluik, Shin, & Graham, 2014; Kelly, 2008; Porras-Hernández & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015; Mishra, 2019). Thus, this study identified theories related to context and TPACK.

Legal bases can also support the objective of this study. According to the United Nations Development Programme (UNDP), the fourth Sustainable Development Goal (SDG) is to safeguard inclusive and equitable quality education and promote lifelong learning opportunities for all. As cited by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2017), teachers are the key to achieving all the SDG4 targets since they are essential for safeguarding quality education.

The Philippine Professional Standards for Teachers (PPST), developed by the Department of Education and Teacher Education Council in 2017, was adopted and implemented through DepEd Order 42, s. 2017 - to replace the National Competency-Based Teacher Standards (NCBTS), includes all the requirements that are expected to be possessed by every Filipino teacher. Particularly, Content Knowledge and Pedagogy is one of the domains in PPST. It distinguishes that the mastery of the teachers in content knowledge and its interrelatedness within and across the curriculum, together with comprehensive knowledge on applying developmentally appropriate pedagogy, is essential to be considered. Further, one of the strands of the said domain is the positive use of ICT to facilitate the teaching-learning process. This indicates that the DepEd and the Teacher Education Council recognize the necessity of assimilating the content knowledge, the pedagogy, and the use of technology in teaching.

One of the most focused study themes related to TPACK is the identification and evaluation of the TPACK of teachers. In the study of Kazu & Erten (2014), it was reported that the teachers have a high level of self-efficacy in all the subdimensions of TPACK. Implicitly, this indicates that teachers see themselves to have an efficient overall TPACK. On the contrary, Bas & Senturk (2018) discovered that the teachers see themselves as having a moderate level of TPACK in general. However, examining the subdimensions of the TPACK separately, it is noticeable that teachers got little knowledge of integrating technology to influence the content (TCK). In the study of Bingimlas (2018), which sought the level of teachers' knowledge in technology, pedagogy, and content in Saudi Arabia, it was reported that there is an average confidence level of TPACK in the majority of the teachers.

One of the inclusions of the study by Singer (2019) was to identify the perceived knowledge level of online teachers in technology, content, pedagogy, and its combinations. Though it was not explicitly indicated, the online teachers perceived and rated themselves to have a good TPACK

in general. In considering the hierarchy of the perceived level of the subdomains, the PCK ranked the highest knowledge domain of the online teachers, followed by content knowledge CK and PK. Further, the analysis of the results showed that the areas related to technology were all rated lower, with TK being the lowest.

In relation to that, Singer (2019) further analyzed the gathered data by comparing and contrasting his findings to the results garnered by Archambault & Crippen (2009). Singer (2019) found that almost all of the results were similar to the findings of Archambault & Crippen (2009). The previous study indicated that the online teachers had rated their knowledge highest in PCK and PK, and closely followed by CK. Also, the previous study reported that the online teachers were less confident in the subdomain knowledge that is related to technology. Herewith, Singer (2019) concluded that the present respondents (online teachers) are still facing the same challenges experienced by the online teachers before as the teacher education institution and professional development of in-service teachers have "remained relatively unchanged as they relate to online teaching and online teachers" (p.87).

The study of Agustini, Santyasa, & Ratminingsih (2019) centered on analyzing the TPACK competence of Education technology alumni for three purposes, namely: (1) to identify the TPACK competence acquired by the alumni after studying at the education technology study program; (2) to provide feedback for improvement of the curriculum of the said study program; and (3) to support the alumni's profession as teachers. The findings showed that the alumni better mastered CK and PCK. Further, it exposed that the alumni were less competent in integrating technology, which made the researchers suggest that the participants still have to improve their competence related to TPACK for professional development; and that the local governments are urged to provide support to the schools in terms of technology integration to cater the needs of the learners in the digital era in the 4.0 industrial revolution.

Castéra, Marre, Yok, Sherab, Impedovo, Sarapuu, Delserieys-Pedregosa, Malik, & Cheneval-Armand (2020) studied (1) the seven components comprising the TPACK framework in a cross-national analysis context; and (2) the factors that influence the TPACK perception. In their study, the sample covered teachers from a total of eight schools across six countries in Asia and Europe, namely: Bhutan, Denmark, Estonia, France, Malaysia, and Pakistan. The researchers successfully gained a

result as their findings supported the seven-factor TPACK model of Mishra & Koehler (2006). Also, the researchers found out that there are relative differences in the TPACK perceptions in terms of country context, and that it is the only essentially significant factor to influence TPACK.

Moreover, in the sequential explanatory study of Muhaimin, Habibi, Mukminin, Saudagar, Pratama, Wahyuni, Sadikin, & Indrayana (2019), the Indonesian Science teachers' TPACK perception was examined through a survey and interview. In their study, they indicated three findings. First, the researchers found that the science teachers are most confident in their CK, PK, and PCK, respectively. It was also noticed that the respondents gained a lower score in all technological-based knowledge domain, with TPCK being the lowest. Second, it revealed that the respondents' perceptions did not differ in terms of teaching experience and age, but did differ in gender, such that male teacher respondents have high scores in technology-related knowledge domains while female teacher respondents scored high in PK and PCK. Lastly, the researchers reported that most of the teachers who participated in the in-depth interview mentioned the difficulties in effective technology integration.

As cited in the works of Ching, Yang, Baek, and Baldwin (2016), and Kimmons, Miller, Amador, Desjardins, and Hall (2015), the use of technology in education is something that preservice teachers should consider. The approach entails discussing and reflecting on TPACK, technology applications used in education, and the benefits and risks of using ICT in education. Further, the engagement of preservice teachers and teacher educators in discussions about their beliefs regarding technology's role in teaching and learning is one of the challenges for Teacher Training Institutions (TTI). This could assist them in understanding the benefits of utilizing a specific technology in relation to a particular teaching technique in a specific subject area and with an individual didactical approach (Baran, Canbazoglu Bilici, Albayrak Sari, & Tondeur, 2019).

In reviewing the related studies, it was observed that only a few considered the context, either as a factor or an additional knowledge domain of TPACK, to be one of the foci in their research. Despite the significance of context in the acquisition and development of TPACK (Mishra & Koehler, 2008), many scholars still failed to take it in (Kelly, 2010). In the systematic review of TPACK-related publications conducted by Rosenberg & Koehler (2015), only 36% of the examined journals had included context in the descriptions or operationalizations of TPACK. If included, different interpretations were accounted for.

Addressing the recommendation of Rosenberg & Koehler (2015) on using the framework advanced by Porras-Hernández & Salinas-Amescua (2013), Jiang, Nilsen, & Whitaker (2017) utilized the said framework to examine the contextual factors affecting the integration of technology in math and science, with the sample from three K-8 schools in Southern California primarily composed of military dependent students. The researchers used a qualitative method, through interviews in focus groups (teacher on special assignment or TOSA, teachers, and students), as they were interested in hearing the different point of views of the focus groups about their experiences in technology integration amid schools' recent adoption of technology. With the findings they had gathered, the researchers found that five contextual factors impact technology integration in math and science. First, in the micro context, a technology expert (TOSA) in each school affects such, as he provides his expertise to the novice teachers. The second factor, still in the micro context, is the lesson design within a curriculum. Third and fourth factors, considered in the meso context, include the role of the administrators in underpinning technology implementation in their school; and the constant professional development among educators. Finally, which happens to be in the macro context, is incorporating the technology-mediated curriculum.

Recognizing the limited number of research that would contribute to understanding the interactions between contextual factors and teachers' TPACK, Roussinos & Jimoyiannis (2019) conducted a study which primarily concentrated on investigating the perceived TPACK of Greek primary education teachers and the related educational context factors. They reported that the sample appeared to believe that they acquired a good level of knowledge in content (CK), pedagogy (PK), and the combination of the former and the latter (PCK). However, compared to the other six sub-scale knowledge, teachers' TPACK scored the lowest. In examining the difference in TPACK self-efficacy in terms of gender, the researchers found that male teachers are more skilled than females concerning technological knowledge (TK) and other technology-related knowledge domains (TCK, TPK, TPACK). On the other variable, findings revealed that the educational context influences and promotes the use of ICT in teaching as perceived by the research sample.

This study determined the relationship between the Technological Pedagogical and Content Knowledge (TPACK), the context, and teachers' teaching performance in secondary schools of Loon, Bohol, for the school

year 2020-2021. The findings served as the basis for proposing an enhancement program.

Specifically, it sought to answer the following questions:

1. What is the respondents' Technological Pedagogical and Content Knowledge (TPACK) level?
2. What is the level of context among the schools as perceived by the respondents?
3. What is the level of teaching performance of the respondents?
4. Is there a significant degree of correlation between TPACK, context, and teaching performance?
5. On the basis of the findings, what enhancement program for the teaching-learning process can be proposed?

The study had the following null hypotheses for acceptance and rejection:

- There is no significant degree of correlation between TPACK and context; TPACK and teaching performance, and context and teaching performance.

RESEARCH METHODOLOGY

Design. The study utilized a quantitative-correlational method using survey research design and documentary analysis in gathering and analyzing the needed data.

Environment. The study was conducted on public secondary schools in Loon, Bohol. The town has four (4) public secondary schools; however, the researcher decided to exclude the one located on an island where road access is impossible. The researcher minimized the population to lessen the risk of exposure to the Corona Virus Disease 19 (CoViD-19) threat during the conduct of the study. Hence, only three of the schools, namely: Gov. Jacinto Borja National HS, the Sandingan National HS, and the Loon South National HS, were the official composition of the research environment.

Respondents. A total of 90 respondents were selected, using random sampling, with a margin of error of 4.33% at 95% confidence interval. Proportional allocation of samples was used to determine the number of respondents per school.

Instruments. The researcher adapted the TPACK.xs of Schmid, Brianza, & Petko (2020). The said tool has seven (7) dimensions with 4 statements each. All of the TPACK dimensions in both the original and the modified tool, which underwent a pilot test, reported acceptable (>.7) to excellent (>.9) internal consistency using Cronbach's Alpha with the aid of SPSS Statistics. Respondents were asked to indicate their agreement or disagreement on the given statements using the Likert scale of 1 if "strongly disagree" (knowledge level is very low); 2 if "moderately disagree" (knowledge level is moderately low); 3 if "moderately agree" (knowledge level is moderately high); and 4 if "strongly agree" (knowledge level is very high).

For the second tool, the researcher adapted the "educational context" dimension, which has nine items, from the survey instrument developed by Roussinos & Jimoyiannis (2019). The reliability test for this dimension in both the original and the modified tool, which undergone also a pilot test, had a Cronbach's Alpha that displays acceptable (.75) and good (.84) internal consistency. Similarly, the respondents were asked to indicate their agreement or disagreement on the given statements using the Likert scale of 1 if "strongly disagree" (poor); 2 if "moderately disagree" (fair); 3 if "moderately agree" (good); and 4 if "strongly agree" (excellent).

In gathering the data for teachers' performance, the researcher used the ratings provided on their Individual Performance Commitment and Review Form (IPCRF) for the S.Y. 2019-2020.

Ethical Consideration. The researcher complied with the Research Ethics Committee's requirements to guarantee the proper observation of the research ethics protocol. A consent letter was handed to the respondents asking permission for them to participate in the study. The respondents who would undertake the survey affixed their signatures in the informed consent. Complete anonymity was heeded in processing the data. Also, the proper handling, archiving, and disposing of the gathered data and the transcript of coding were observed. The contact details of the researcher and the institutional Research Ethics Committee were included in the consent form to give them the ease of contacting the responsible person if they have issues before, during, and after the study.

Statistical Treatment. The results of the conduct of the study were treated statistically using Statistical Package for the Social Science (SPSS) software. The data were subjected to a normality test to determine the appropriate statistical tools. The normality test results revealed that the

data were skewed. Hence, nonparametric tests were used in testing the study's hypotheses.

Weighted mean was utilized in identifying the level of teachers' TPACK and the level of condition of the context as perceived by teachers. The teachers' performance was statistically treated using both simple percentages and weighted mean. On the other hand, Spearman Rank Correlation was used to find the degree of correlation between teachers' TPACK level, perceived level of context, and teaching performance.

RESULTS AND DISCUSSION

Level of Technological Pedagogical and Content Knowledge (TPACK). The data revealed that the TPACK level of the teacher respondents was very high as it gained an overall mean of 3.405. This implies that the respondents understand the subject matter (content) they are teaching, the appropriate approaches (pedagogy) they will apply, the technology they will utilize, and the intricate interaction of these three bodies of knowledge. As far as the conducted review of related studies is concerned, no study has been found to support and confirm this specific result of the current research. In the study of Kazu & Erten (2014), Akturk & Ozturk (2019), and Muhaimin et al. (2019), it was implicitly revealed that the in-service teachers only have a high level of TPACK. On the other hand, Bas & Senturk (2018) gathered a different finding as they disclosed that the in-service teachers rated themselves to have a moderate level of TPACK in general. Hence, more research must be conducted to better explain the various results garnered by the previous studies and the current study.

Moreover, the summary of the garnered level of the respondents in each TPACK subdimension revealed that the teacher respondents had a very high level in all of the TPACK subdimensions. However, considering the hierarchy of the perceived level in each subdomain shows that Content Knowledge (CK) ranked as the highest knowledge domain (3.486) among the seven subdimensions. This result implies that the respondents are more knowledgeable on their specific subject matter. This finding can be supported by the notion proposed by Shulman (1987) that if the teachers' knowledge were to be arranged systematically, content knowledge would be the first as it is the primary source of teaching knowledge base. Further, the finding is parallel to the rankings revealed in the study of Muhaimin

et al. (2019), Agustini, Santyasa, & Ratminingsih (2019), Bas & Senturk (2018), and Riandi, Apriliana, & Purwianingsih (2018). Similar results establish that teachers show more confidence in their content discipline than others. As Jones & Moreland (2003) mentioned, good knowledge of the content discipline can positively affect the skill of the teachers to decide on changing pedagogical strategies to create better learning opportunities.

The respondents were also found to have a very high Pedagogical Content Knowledge (PCK) level with a weighted mean of 3.461. This finding signifies that the respondents conform with Shulman's (1987) idea that "teaching necessarily begins with a teachers' understanding of what is to be learned and how it is to be taught" (p. 7). It also revealed that CK comes first to PCK based on the ranking. This result is parallel to the findings and interpretation of several researchers. Friedrichsen, Abell, Pareja, Brown, Lankford, & Volkmann (2009) found that CK dominates the initial teaching knowledge. With this finding, Kleickmann, Richter, Kunter, Elsner, Besser, Krauss, & Baumert (2013) interpreted that CK is a prerequisite to developing one's PCK.

The data also showed, with the weighted mean of 3.458, that the respondents had a very high Pedagogical Knowledge (PK). This result implies that they perceived themselves to have an in-depth understanding of the nature of the teaching-learning process. Further, this signifies that the teacher respondents understand learners' knowledge construction, skill acquisition, mental habits, and positive outlook toward learning (Mishra & Koehler, 2006).

The Technological Pedagogical Knowledge (TPK) of teacher respondents was found also to be very high (3.403). This signifies that the teachers have an excellent knowledge of integrating appropriate technology to shape and influence the teaching-learning process. This particular result does not agree with the outcome of Marcial's (2015) study as it revealed that the teacher educators have a moderate level of pedagogical integration of ICT.

The attained favorable level (3.386) of Technological Pedagogical Content Knowledge (TPCK) indicates that the teacher respondents had an instinctive and great knowledge of the complex interplay among the three-core knowledge element evident through integrating relevant and suitable pedagogical strategies and technologies in delivering the lesson content (Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009). Moreover, it is reasonable to state that the respondents possessed a "good

or effective teaching with technology" (Mishra & Koehler, 2006; Koehler, Mishra, & Cain, 2013) on the obtained level of this domain. It can also be affirmed that the respondents think about the technology integration, and the technology itself, as part and enrichment of their pedagogical methods in teaching content (Cox, 2008).

The data also revealed that the respondents had very high Technological Content Knowledge (TCK) level (3.350). This denotes that they understand how technology integration can affect and transform the lesson content to be taught. Focusing on TPK and TCK dimensions, it was found out that TPK is more potent and higher than the TCK. According to the conducted review of literature by Hofer & Harris (2012), this result is similar to several studies. Hofer & Harris (2012) found out that TPK is recognized significantly more often than their TCK. As noted by them, one possible reason why TPK is more evident than TCK among experienced teachers is that they tend to focus more on their pedagogy than the content to be taught as they participate more often in professional development efforts centered on technology and technology integration. They also included that it could be possibly caused by the unavailability of the various tools to be used in teaching and the teachers' unawareness of subject-specific means of integrating technologies in instruction.

The Technological Knowledge (TK) ranked the lowest (3.289) among all the seven subdimensions, which is similar to the results found by Akturk & Ozturk (2019), Singer (2019), Bingimlas (2018), and Archambault & Crippen (2009). It can be said that they have lesser confidence in it compared to other subdimensions. Furthermore, the ranking shows that all the technology-related subdomains (TPK, TPCK, TCK, and TK) were rated lower and took the bottom four in the hierarchy. Regardless of the order of the technology-related subdomains at the bottom four, this result supports the findings gathered by several studies such as of Singer (2019), Akturk & Ozturk (2019), Agustini, Santyasa, & Ratminingsih (2019), Muhaimin et al. (2019), Bingimlas (2018), Roussinos & Jimoyiannis (2019), and Archambault & Crippen (2009). Since it was found out that the teacher respondents' TK ranked the lowest, the low ranking of another technology-related knowledge is not impossible to manifest.

However, knowing the fact that they unveiled a very high level of knowledge in all of the technology-related subdimensions, it can be said that they are adapting to the information age. Besides, it was found out that some the digital immigrants love new technology (Waycott, Bennett,

Kennedy, Dalgarno, & Gray, 2010), and their digital literacy has increased due to the increased exposure to it as demanded by the new century (Howlett & Waemusa, 2018).

Perceived Level of Context. Generally, the respondents perceived that their ICT-grounded context had an excellent grade (3.299). This implies that there is a positive influence of the ICT on their school environment as well as the teachers' and learners' characteristics. The present study's gathered result is parallel to the study of Roussinos & Jimoyiannis (2019).

Teaching Performance. The data unveiled that 89 out of 90 respondents (98.9%) had a very satisfactory teaching performance. Only one of the teacher respondents (1.1%) had an outstanding teaching performance. Generally, with an overall mean of 4.220, the teacher respondents have a very satisfactory teaching performance. This result is similar to the findings of Susa (2017). Moreover, the result signifies that the respondents' performance met and surpassed the expectations evident through achieving all goals, objectives, and target (CSC MC No.6, s. 2012, p.11).

Correlation Between TPACK, Context, and Teaching Performance. In analyzing the correlation between TPACK and context, it was found that the p-value was lesser than the significance level ($p<0.05$). Hence, it is reasonable to reject the null hypothesis. This indicates a significant relationship between the respondents' TPACK and the context level as perceived by them. Further, the said result suggests that the respondents' TPACK is related to how the role of technology is used in their school. It can also be affirmed that the role of technology in school matters to the TPACK of the respondents.

In connection, this finding gives empirical and substantial support to the notion that context affects the TPACK claimed by both the proponents (Mishra & Koehler, 2006; 2008; Koehler, Mishra, & Cain, 2013; Koehler, Mishra, Kereluik, Shin, & Graham, 2014) and the other TPACK-related researchers (Porras-Hernández & Salinas-Amescua, 2013; Rosenberg & Koehler, 2015; Chai, Koh, & Tsai, 2013; Koh, Chai, & Tay, 2014; Cai, Wen, Cai, Lv, 2019). Similarly, the result firmly supports the Ecological Theory (Bronfenbrenner, 1979) and Situated Cognition Theory (Brown, Collins, & Duguid, 1989), which both assert that acquisition and development (of knowledge, in this instance) have a relationship with and is affected by the environment or specific context that surrounds the individual.

Table 1. Correlation Between TPACK, Context, and Teaching Performance

Variables	Spearman Rank Correlation Value	P-value	Decision	Interpretation
TPACK and Context	0.605	0.000	Reject H_0	Significant
TPACK and Teaching Performance	0.021	0.846	Accept H_0	Insignificant
Context and Teaching Performance	0.178	0.093	Accept H_0	Insignificant

On the other hand, it was found out that the TPACK of the teacher respondents has no significant relationship to their teaching performance. It was decided to accept the null hypothesis since the p-value (0.846) is greater than the level of significance (p>0.05). This implies that the TPACK of the teacher respondents is not associated with their teaching performance. This finding does not agree with the conclusion of Hero (2019). In his study, he found out that the Social Studies teachers' teaching performance from public secondary schools of Valenzuela City, Philippines, is affected by integrating technology into the teaching-learning process.

Similarly, the result showed that the teacher's context is insignificant to their teaching performance. It unveiled that the p-value is greater than the level of significance (p>0.05), the null hypothesis is accepted. This signifies that the ICT-grounded context of the teacher does not matter to their teaching performance.

CONCLUSIONS

The Technological Pedagogical and Content Knowledge (TPACK) framework, developed by Mishra & Koehler (2006), summarizes the necessary knowledge and skills for 21st-century teaching. In the present study, the teachers are regarded to have this knowledge and skills as they showed a very high level of TPACK. This finding signifies that they are strongly confident in their knowledge of technology, pedagogy, content, and the interaction of these three knowledge bases. In considering the subdomains under the TPACK, the teachers have a very high level in all seven. However, these subdomains' hierarchy revealed that the teachers' Content Knowledge (CK) is the strongest among the seven while the Technological Knowledge (TK) is the weakest. This result supports the

notion of Shulman (1987) that content knowledge is the primary source of teaching knowledge base.

The present research made a notable initiative as it addressed the recommendation of Porras-Hernández & Salinas-Amescua (2013) and Rosenberg & Koehler (2015), which is to give attention to the context. It was identified that there is a tremendously positive relationship between ICT on the teachers' school environment and their characteristics and learners' attributes.

Moreover, this study also determined the teachers' teaching performance level. The finding showed that the majority of the teachers had a very satisfactory teaching performance based on their Individual Performance Commitment and Review Form (IPCRF) for the school year 2019-2020.

Furthermore, the existence of a relationship between TPACK, context, and teaching performance was tested. It was determined that the TPACK level of the teachers is significantly related to their context. This specific result statistically, empirically, and substantially supports the notion that context affects the TPACK claimed by both the proponents and other TPACK-related researchers. On the other hand, the teachers' TPACK and the context do not matter in their teaching performance.

RECOMMENDATIONS

Based on the above mentioned conclusions and findings of the study, the researcher came up with the following recommendations.

1. The findings and recommendations of this study should be disseminated for the public interest, especially to the Filipino teachers. Along with the findings and recommendations, immediate dissemination of the output of this study (proposed enhancement program) to the Department of Education (DepEd) should be done.
2. To enhance the Technological Pedagogical and Content Knowledge (TPACK) of the teachers, the following are recommended:
    2.1. The Department of Education (DepEd), should provide and conduct conferences, seminars, and training workshops focusing on TPACK acquisition and development.
    2.2. In-service training (INSET) of teachers should also include the TPACK acquisition and development.

2.3. The concept of TPACK should be immediately introduced during the first phase of a teaching career (preservice) to build a stronger foundation of it. Thus, the DepEd is recommended to work together with the Commission on Higher Education (CHED) and Teacher Education Institutions (TEI's) for the restructuring of their curriculum and offered programs grounded on the TPACK framework.

2.4. For better TPACK acquisition and development, the three knowledge bases should be strengthened first. Thus, the teachers should improve their content knowledge, pedagogical knowledge, and most especially in technology knowledge as it appeared to be the weakest among the seven TPACK subdomains.

2.5. The DepEd can modify the Classroom Observation Tool (COT) in the Results-Based Performance Management System (RPMS) by basing the indicators in TPACK framework. This action will drive the teachers to base their performance in such.

2.6. Teachers may enroll in Massive Open Online Courses (MOOC), focusing on their desired learning goal and skill development.

2.7. Teachers may assess the level of their knowledge on their content, pedagogy, technology, and complex interaction of these three knowledge bases.

3. To enhance the Technological Knowledge (TK) of the teachers, the following are recommended:

3.1. The DepEd should allocate enough budget for the widening and strengthening of the technology support to all the schools across the Philippines. This support may include the issuance of relevant and appropriate digital technologies and an ICT personnel appointment to each school. The position of ICT coordinator should not be given to a teacher as it will only give burden to him or her. Moreover, the ICT personnel shall be required to take Professional Education (Prof. Ed.) units in accredited TEI's.

3.2. The DepEd should require the district schools to organize a workshop at each school giving the teachers the

opportunity to explore, both individually and collaboratively, the digital technologies, instead of spoon-feeding how to operate them.

3.3. The appointed ICT personnel of each school should conduct monthly short training on how to use the different ICT's.

4. To enhance the Technological and Content Knowledge (TCK) of teachers, the following are recommended:
    4.1. The DepEd should require the district schools to organize an Education Technology (Ed Tech) training relevant to the different content disciplines. The district schools should separate the training based on the different subject matter (e.g., Ed Tech training for Mathematics should be conducted separately to training for science).
    4.2. The DepEd should organize research congress on using technologies in the different content field.
    4.3. The teachers should engage in research presentation focused on technology integration in their area of specialization.
5. To enhance the Technological Pedagogical Content Knowledge (TPCK) of teachers, the following is recommended:
    5.1. In-service Training (INSET) should cover how to blend teaching approaches and appropriate technologies to deliver the subject matter.
6. To enhance the ICT-supported infrastructure on the schools across the Philippines, the DepEd should allocate budget for strengthening and widening the ICT support.

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