International Journal of Research Studies in Education
2022 Volume 11 Number 9, 25-31

Technological, Pedagogical, and Content Knowledge (TPACK) among public school teachers of Kasibu West District

Guiaoan, Glaysa S. ✉
Kongkong Elementary School, Philippines (glaysa.guiaoan@deped.gov.ph)

ISSN: 2243-7703
Online ISSN: 2243-7711

Received: 20 February 2022 **Revised**: 25 March 2022 **Accepted**: 1 April 2022 OPEN ACCESS
Available Online: 15 April 2022 **DOI**: 10.5861/ijrse.2022.813

Abstract

In this time of pandemic, the education system in the world is suffering. As a result, the teachers need to be resilient and adaptable with the new normal in order to have innovations in facilitating learning amidst the pandemic. Educators need to find solutions to continuously facilitate the learning process. Furthermore, teacher's role is very essential in the implementation of the curriculum which can be enhanced with remarkable knowledge in the use of technology, pedagogy and content along field of specialization. This descriptive-correlational study hence aimed to measure the level of technological, pedagogical, and content knowledge (TPACK) of public elementary teachers in Kasibu West District. This quantitative study which involved 40 randomly selected respondents used descriptive statistics through computation of means which showed that the respondents' levels of technological, pedagogical, and content knowledge are qualitatively described as outstanding. Using correlational procedures at 0.05 level of significance, the study showed significant interrelationship among respondents' levels of technological, pedagogical, and content knowledge which means these variables affect one another. Hence, a learning and development activity may be designed and implemented with focus on either technological knowledge, pedagogical knowledge, or content knowledge to sustain desirable level of TPACK among the public elementary teachers in the district.

Keywords: content knowledge, pedagogical knowledge, technological knowledge, technological, pedagogical, content knowledge

Technological, Pedagogical, and Content Knowledge (TPACK) among public school teachers of Kasibu West District

1. Introduction

Learning is vigorous that constantly change from time to time and teachers are the well-known experts in the process. The way that a teacher learned the lesson before is not the same way that the lessons are being learned at present. The learners at present think and process information before is not the same way that lessons are learned now. They think and process information essentially different from their ancestors. Some of the learners might necessitate the most intensive approach to adapt instructions in the modification of delivering instructions (Iris Center, 2019). This pandemic, the process of learning is quite challenging. I the educative system, the teachers as well as the managers essentially need to find pedagogy and technology suited to the new normal set up of education to be able to achieve the goal of the learning process.

Researches on the implementation of TPACK based on the context explored more on how TPACK may be implemented and be considered in different situation. This study focused in unveiling the technological, pedagogical, and content knowledge of teachers in Kasibu West District. It is a mountainous area in the northern part of Luzon. The district has 24 schools. Some schools have no signal, no internet connectivity, and no electricity. It is important to know the TPACK of the teachers to know how ready and resilient they are in facing the challenges in the educative system most especially this time of pandemic. Despite the challenges being encountered in Philippine public schools such as lack of internet access (http://charge.org/change.org, 2019), the country twisted to information and communication technology (ICT) as a tool in improving the teaching and learning process this new normal (Crisolo, 2018; Muthmainnah, 2021). The teachers are not sure if the changes in the educational system support their needs in the process. The expectations from the teachers are high since that they play the important role in the field of education. Consequently, the teachers must possess the TPACK for them to easily adapt changes and make solutions to immediate problems since it is the aim of the Department of Education's mission and vision to produce highly competent, ethical and service-oriented professionals that contribute to the sustainable socio-economic growth and development of the nation. If all the teachers in the district assess their learning, and knowledge specifically in TPACK, it will produce better and effective learning process in the educative system.

The technological pedagogical content knowledge (TPACK) model conceptualized by Koehler and Mishra (2005) was used as interventions by several researchers in improving teachers' level of TPACK (Angeli & Valanides, 2009; Chai, Koh, & Tsai, 2010). According to McGraw-Hill (2019), Technological Pedagogy Content Knowledge (TPACK) is a theory that was developed to explain the set of knowledge that teachers need to teach their students, to teach effectively, and to use technology. Other researchers had concentrated on the relationship between TPACK levels of teachers and some variables (Lee & Tsai, 2008; Niederhauser & Perkmen, 2010). Further, other researchers especially in Asian countries (Jeong So & Kim, 2009; Koh, Chai, & Tsai, 2010; Liang, Chai, Koh, Yang, & Tsai, 2013) and counties outside Asia (Alayyar, Fisser, & Voogt, 2012; Angeli & Valanides, 2009; Niess, 2005) had investigated the level of TPACK of teachers. Basically, Technological Pedagogical Content Knowledge (TPACK) is the efficiency of integrating technology in teaching the lesson which is the model application of learning in the teaching and learning process (Santos & Castro, 2021).

Koehler and Mishra (2008) describes TPACK as the manner of how the teachers understand technologies and pedagogical content and its interaction in coming up with teaching integrated with technology. The knowledge of how to make concepts understandable by using technology, knowledge of how to use technology with pedagogical knowledge in order to meet the needs of students, knowledge of the difficulties in learning concepts and how to eliminate these difficulties buy using technology, knowledge of students' epistemological beliefs and background knowledge and how to increase their epistemological beliefs level by using technology

were all included in the TPACK (Koehler & Mishra, 2008).

As reported by Peruski and Mishra (2004), the compensation is most evident whenever using a new educational technology suddenly forces teachers to confront basic educational issues and reconstruct the dynamic equilibrium among all three elements. This view inverts the conventional perspective that pedagogical goals and technologies are derived from content area curricula. Things are rarely that simple, particularly when newer technologies are employed. The introduction of the Internet, for example – particularly the rise of online learning – is an example of the arrival of a technology that forced educators to think about core pedagogical issues, such as how to represent content on the Web and how to connect students with subject matter and with one another.

Koehler and Mishra (n.d.) also mentioned that the TPACK framework is built on seven elements and describes the seven areas of teacher knowledge that serve as the heart of good teaching.

1. Pedagogical knowledge (PK): Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning.

2. Technology knowledge (TK): Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as desktop computer, internet connection, laptop, monitor for projection/television, printer, projector, scanner, speaker, tablet, etc.

3. Content Knowledge (CK): Content knowledge is the "knowledge about actual subject matter that is to be learned or taught". Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas.

4. Pedagogical content knowledge (PCK): Pedagogical content knowledge refers to the content knowledge that deals with the teaching process. Pedagogical content knowledge is different for various content areas, as it blends both content and pedagogy with the goal being to develop better teaching practices in the content areas.

5. Technological pedagogical knowledge (TPK): Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understand that using technology may change the way teachers teach.

6. Technological content knowledge (TCK): Technological content knowledge refers to the knowledge of how technology can create new representations for specific content. It suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area.

7. Technological Pedagogical Content Knowledge (TPACK): Technological pedagogical content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and technologies.

At present, the teachers desired TPACK competencies in facilitating the potential teachers and help them develop their technology related skills and knowledge. As a result, the teachers must be provided with chances in developing practical and pedagogical skills by utilizing the current technologies in the teaching-learning process for the learners' benefits (Yurdakul 2011). Hence, this study was conducted.

1.1 Objectives of the Study

Generally, the study aimed in unveiling the technological, pedagogical, and content knowledge among public school teachers of Kasibu West District, School Year 2021-2022. Particularly, it aimed at systematically obtaining answers to the following research questions: What is the level of technological knowledge of the

public school teachers of Kasibu West District? What is the level of pedagogical knowledge of the respondents? What is the level of content knowledge of the respondents? Is there a significant interrelationship among the respondents' technological, pedagogical, and content knowledge?

2. Methodology

The study employed descriptive research method to properly characterize the technological, pedagogical, and content knowledge among public school teachers. The correlational approach was used to measure the significant relationship between the dependent and independent variables. The study was conducted after the approval of the authorities. Further, utmost confidentiality was strictly observed. This study was conducted at Kasibu West District, SY 2021-22 involving 40 randomly selected respondents. The technological, pedagogical, and content knowledge were gathered using the researcher-made questionnaire. The statistical tools used to unveil answers to the research questions were means, percentage, and Person Product Moment correlation coefficient (Pearson-r) with 0.05 level of significance.

3. Results and discussion

After carefully organizing the collected data relevant to the solutions of the foregoing research problems, the following results were disclosed:

3.1 Technological Knowledge of Public School Teachers of Kasibu West District

Table 1 shows the outstanding pedagogical knowledge of public school teachers of Kasibu West district with the overall mean of 3.85 which implies that the teachers in the district had acquired the necessary technological knowledge that are being applied in teaching-learning process.

Table 1

Technological Knowledge of the Respondents

Statement	Mean	Verbal Description
1.I know how to solve my own technical problems.	3.6	Outstanding
2.I can learn technology easily.	3.8	Outstanding
3.I keep up with important new technologies.	3.8	Outstanding
4.I frequently play around with the technology.	4.0	Outstanding
5.I know about a lot of different technologies.	4.0	Outstanding
6.I have the technical skills I need to use technology.	3.8	Outstanding
7.I have had sufficient opportunities to work with different technologies.	4.0	Outstanding
Overall Mean	3.85	Outstanding

The knowledge of how to make concepts understandable by using technology, knowledge of how to use technology with pedagogical knowledge in order to meet the needs of students, knowledge of the difficulties in learning concepts and how to eliminate these difficulties buy using technology, knowledge of students' epistemological beliefs and background knowledge and how to increase their epistemological beliefs level by using technology were all included in the TPACK (Koehler & Mishra, 2008).

3.2 Pedagogical Knowledge of the Respondents

Table 2 shows an outstanding pedagogical knowledge of the teachers as incurred by the overall mean of 3.83 which is qualitatively described as outstanding. This implies that the teachers in the district developed their pedagogical knowledge. As stated by Anand Shirke (2021), pedagogy is the way of teaching students, whether it is the theory or practice of educating. It is a relationship between the culture and techniques of learning. The main aim of pedagogy is to build on previous learning of the students and work on the development of skills and attitudes of the learners. Pedagogy enables the students to get a thorough understanding of the subject and helps them in applying those learnings in their daily lives outside of the classroom.

Table 2

Pedagogical Knowledge of the Respondents

Statement	Mean	Verbal Description
1. I know how to select effective teaching approaches to guide student thinking and learning in literacy.	3.5	Very Satisfactory
2. I know how to select effective teaching approaches to guide student thinking and learning in science.	4.0	Outstanding
3. I know how to select effective teaching approaches to guide student thinking and learning in mathematics.	3.9	Outstanding
4. I know how to select effective teaching approaches to guide student thinking and learning in social studies	3.9	Outstanding
Overall Mean	3.83	Outstanding

3.3 Content Knowledge of the Respondents

To describe the content knowledge of the respondents, a questionnaire was carried out. In summary, the respondents incurred an overall mean of 3.78 which is qualitatively categorized as outstanding. The result implies that the teachers in Kasibu West district are well-equipped with the content knowledge needed in performing their tasks as teachers.

Table 3

Content Knowledge of the Respondents

Statement	Mean	Verbal Description
1.I have sufficient knowledge about mathematics.	3.4	Very Satisfactory
2.I can use a mathematical way of thinking.	4.0	Outstanding
3.I have various ways and strategies of developing my understanding of mathematics.	3.8	Outstanding
4.I have various ways and strategies of developing my understanding of social studies.	3.8	Outstanding
5.I have sufficient knowledge about social studies.	3.4	
6.I can use a historical way of thinking.	4.0	Outstanding
7.I have various ways and strategies of developing my understanding of science.	3.6	Outstanding
8.I can use a scientific way of thinking.	3.8	Outstanding
9.I have sufficient knowledge about science.	3.6	Outstanding
10.I have various ways and strategies of developing my understanding of literacy.	4.0	Outstanding
11.I can use a literary way of thinking.	4.0	Outstanding
12.I have sufficient knowledge about literacy	4.0	Outstanding
Overall Mean	3.78	Outstanding

Basically, Content Knowledge is referred to the body of knowledge and information that teachers teach and that students are expected to learn in a given subject or content area (The Glossary of Education Reform, 2016).

3.4 Analysis of interrelationship between the respondents' technological, pedagogical, and content knowledge

As part of the investigation, the findings registered significant values at 0.05 level of significance with the computed correlation coefficients of 1.000 (p=.000) for technological and pedagogical, 0.375 (p=.017) for pedagogical and content, and 0.375 (p=.017) for content and technological knowledge of the respondents respectively. Therefore, the null hypothesis is correspondingly rejected which implies that the technological, pedagogical, and content knowledge correlate with one another.

Table 4

Summary of Correlation of Respondents' Technological, Pedagogical, and Content Knowledge

Variables	Correlation Coefficient	p-value	Remarks
Technological Vs Pedagogical	1.000	0.000	Significant
Pedagogical Vs Content	0.375	0.017	Significant
Content Vs Technological	0.375	0.017	Significant

The main goal of this study is to ascertain the correlation of respondents' technological, pedagogical, and

content knowledge. To realize such, correlational procedures were performed and it was disclosed that significance in correlation exists between teachers' technological, pedagogical, and content knowledge. The result of the study runs parallel with the exposition of Koehler and Mishra (2005) that several researchers had used interventions in improving teachers' level of TPACK (Angeli & Valanides, 2009; Chai, Koh, & Tsai, 2010). Further, TPACK is used according to Koehler & Mishra (2008) as the manner of how the teachers understand technologies and pedagogical content and its interaction in coming up with teaching integrated with technology.

4. Conclusions

The results discussed in the foregoing section could be summarized through the following conclusions to specifically address the research questions:

- The study shows the outstanding pedagogical knowledge of public school teachers of Kasibu West district with the overall mean of 3.85 which implies that the teachers in the district had acquired the necessary technological knowledge that are being applied in teaching-learning process.
- It shows an outstanding pedagogical knowledge of the teachers as incurred by the overall mean of 3.83 which is qualitatively described as outstanding. This implies that the teachers in the district developed their pedagogical knowledge.
- To describe the content knowledge of the respondents, a questionnaire was carried out. In summary, the respondents incurred an overall mean of 3.78 which is qualitatively categorized as outstanding. The result implies that the teachers in Kasibu West district are well-equipped with the content knowledge needed in performing their tasks as teachers.
- As to the technological, pedagogical, and content knowledge, the public-school teachers of Kasibu West district were outstanding. Furthermore, their levels of technological, pedagogical, and content knowledge correlate with one another.

4.1 Recommendations

In the light of the significant findings of the study, the following are recommended:

Diagnosis. With the nature of the work of the teachers, there is a need for a learning and development activity which is focused on either technological knowledge, pedagogical knowledge, or content knowledge to sustain desirable level of TPACK among the public elementary teachers in the district.

Pedagogy. The teachers be thoroughly equipped with the desired knowledge and skills to enhance their Technological Pedagogical Content Knowledge (TPACK).

Research. Other factors be considered including other variables as topic in research investigations in the future.

5. Reference

Alayyar, G., Fisser, P., & Voogt, J. (2012). Developing technological pedagogical content knowledge in pre-service science teachers: Support from blended learning. *Australasian Journal of Educational Technology, 28*(8), 1298-1316.

Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education, 52*(1), 154-168.

Beri, N., & Sharma, L. (2019). A Study on Technological Pedagogical and Content Knowledge among Teacher-Educators in Punjab Region. *International Journal of Engineering and Advanced Technology*

(IJEAT), 8(5C).

Chai, C., Koh, J., & Tsai, C. (2010). Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK). *Educational Technology & Society, 13*(4), 63-73.

Jeong So, H., & Kim, B. (2009). Learning about problem-based learning: Student teachers integrating technology, pedagogy and content knowledge. *Australasian Journal of Educational Technology, 25*(1), 101-116.

Koehler, M., & Mishra, P. (2008). *Introducing TPACK. In Handbook of technological pedagogical content knowledge (TPCK) for educators* (pp. 3-29). New York: Routledge for the American Association of Colleges for Teacher Education.

Koh, J., Chai, C., & Tsai, C. (2010). Examining the technological pedagogical content knowledge of Singapore pre-service teachers with a large-scale survey. *Journal of Computer Assisted Learning, 26*(6), 563-573.

Lee, M., & Tsai, C. (2008). Exploring teachers' perceived self-efficacy and technological pedagogical content knowledge with respect to educational use of the world wide web. *Instructional Science, 38*(1), 1-21.

Muthmainnah, Galal, M., Varghese, K., Del Castillo, F., & Ghofur. (2021). The students' needs in developing EFL materials ICT based. *Okara: Jurnal Bahasa Dan Sastra*, *12*(2). https://doi.org/10.19105/ojbs.v15i2.4679

Niederhauser, D., & Perkmen, S. (2010). Beyond self-efficacy: Measuring preservice teachers' instructional technology outcome expectations. *Computers in Human Behavior, 26*(3), 436-442.

Niess, M. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. *Teaching and Teacher Education, 21*(5), 509-523.

Santos, J. & Castro, R. (2021). Technological Pedagogical content knowledge (TPACK) in action: Application of learning in the classroom by pre-service teachers (PST). *Social Sciences & Humanities Open, 3*(1). https://doi.org/10.1016/j.ssaho.2021.100110