PEDAGOGICAL CONTENT KNOWLEDGE AND TECHNOLOGY PROFICIENCY OF TEACHER

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Abstract: This study aimed to determine which domain of pedagogical content knowledge best influences technology proficiency of teacher. This study utilized the non-experimental quantitative research design using descriptive technique involving teachers in Sarangani District, Davao Occidental Division, Philippines. The study was conducted on the second semester of school year 2020-2021. Research instruments on pedagogical content knowledge and technology proficiency of teacher were used as source of data. Using mean, pearson-r, and regression as statistical tools to treat the data, the study showed the following results: the level of pedagogical content knowledge is high, the level of technology proficiency of teacher is high, there is a significant relationship between pedagogical content knowledge and technology proficiency of teacher, the domains of pedagogical content knowledge that best influences technology proficiency of teacher is pedagogical content knowledge.

Keywords: Pedagogical Content Knowledge, Technology Proficiency of Teachers, Educational Management

1. Introduction

Technology proficiency is the ability to use technology to communicate effectively and professionally, organize information, produce high-quality products, and enhance thinking skills. In classroom settings, technology proficiency refers to the ability of teachers to integrate technology to teach and facilitate, as well as to improve learning, productivity, and performance. These abilities are needed to participate in a technological world (Gallego, 2014).

Technology proficiency enables teachers to identify and explore a wide variety of technological tools and devices in order to determine and select those that best respond to teaching and learning contents. Among teachers, basic proficiency in information technologies is typically used to communicate electronically, organize activities and information, and create documents in schools or higher-education institutions (Ergönenç, Neumann& Fischer, 2014).

However, as the teaching and learning landscape have evolved though out the years, teachers experience difficulty in using technology in teaching and learning. Proficiency in using technological tools and devices can be achieved through experience and instruction. It is necessary to introduce experimentation into teaching practices and maintain accessible technological tools and devices. Technology proficiency seems relevant to many aspects of the teaching profession, such as lesson preparation and development of teaching kids (Aydin, Demirdogen, Akin, Uzuntiryaki-Kondakci &Tarkin, 2015).

Other aspects that impact teacher decisions to introduce technology into teaching and learning activities are teachers' beliefs about the way the subject should be taught and the skills associated with teacher competence in managing classroom activities using technology tools and devices. Therefore, teachers must be able to apply the technological knowledge and skills required in professional job roles and responsibilities in order to achieve the expected outputs (Krause & Coates, 2008).

As an educator in the 21st century, it is imperative to integrate technology into the curriculum for a variety of reasons. Students need to be exposed to and be familiar with technologies in order to compete in the world

marketplace, and they need to be able to integrate them in dynamic social environments. The world is dominated by technology in all forms, and to be successful, students must possess 21st-century skills. In addition, technology proficiency improves efficiency in teaching and facilitating. Being more efficient usually means that teachers have more time, and it allows additional space for innovation, planning, conversing, thinking, and creativity. Technology can be instrumental in making teachers more efficient. These skills are needed by teachers to be successful in their work (Cavanagh & Koehler, 2013).

The problem-situations mentioned are the experiences of teachers on technology proficiency. The need to address the problem will ensure greater learning opportunities for the students. Hence, the researcher is prompted to conduct this study to address the knowledge gap in terms of finding relevant evidence in the local context regarding attitudes towards the use of multimedia among teachers and engagement strategies in an online learning environment of the students as the researcher has rarely come across with the same study on the same topic in the local setting.

Research Objectives

This study aims to find out which domain of pedagogical content knowledge best influences technology proficiency of teacher. Specifically, this study sought to answer the following objectives:

1. To describe the level of pedagogical content knowledge in terms of:
1.1. pedagogical knowledge;
1.2. pedagogical content knowledge;
1.3. technological pedagogical knowledge, and
1.4. technology pedagogy and content knowledge.
2. To ascertain the level of technology proficiency of teacher in terms of:
2.1 technology proficiency;
2.2 professional development and instruction, and
2.3 emerging technologies for student learning.
3. To determine the significant relationship between pedagogical content knowledge and technology proficiency of teacher.
4. To determine which domains of pedagogical content knowledge best influences technology proficiency of teacher.

Hypothesis

The following hypothesis will be treated at 0.05 level of significance.

1. There no significant relationship between pedagogical content knowledge and technology proficiency of teacher.
2. No domains of pedagogical content knowledge best influences technology proficiency of teacher.

2. Methods

This study employed the non-experimental quantitative research design utilizing correlational technique. A substantial proportion of quantitative educational research is non-experimental because many important variables of interest are not manipulable. Because non-experimental research is an important methodology employed by many researchers, it is important to use a classification system of non-experimental methods highly descriptive of what we do and which also allows us to communicate effectively in an interdisciplinary research environment. Correlational research designs evaluate the nature and degree of association between two naturally occurring variables.

3. Results

Presented in Table 1 is the level of *Information and Communication Technology Competency of Teachers* with the overall mean of 3.57 with a descriptive equivalent of *high* indicating that all enumerated indicators were oftentimes

manifested. The overall mean was the results obtained from the mean of the indicators for the specific items from the questionnaire intended for this particular indicator which is appended in this study.

Among the enumerated indicators, *technological pedagogical knowledge* obtained the highest mean rating of 3.72 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: I can choose technologies that enhance the teaching approaches for a lesson, I can choose technologies that enhance students' learning for a lesson, I am thinking critically about how to use technology in my classroom, I can adapt the use of the technologies that I am learning about to different teaching activities.

The indicator technology pedagogy and content knowledge obtained the mean of 3.60 with a descriptive rating of high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: I can teach lessons that appropriately combine learning areas, technologies and teaching approaches, I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn, I can use strategies that combine content, technologies and teaching approaches that I learned about in my coursework in my classroom, and I can choose technologies that enhance the content for a lesson.

Table 1. Pedagogical Content Knowledge

Indicator	SD	Mean	Descriptive Levels
Pedagogical Knowledge	0.684	3.50	High
Pedagogical Content Knowledge	0.53	3.48	High
Technological Pedagogical Knowledge	0.613	3.72	High
Technology Pedagogy and Content Knowledge	0.50	3.60	High
Overall	**0.34**	**3.57**	**High**

Pedagogical Knowledge obtained a mean rating of 3.50 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: I know how to assess student performance in a classroom, I can adapt my teaching based-upon what students currently understand or do not understand, I can adapt my teaching style to different learners, I can assess student learning in multiple ways.

Pedagogical Content Knowledge obtained a mean rating of 3.48 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: I know how to select effective teaching approaches to guide student thinking and learning in mathematics, I know how to select effective teaching approaches to guide student thinking and learning in literacy, I know how to select effective teaching approaches to guide student thinking and learning in science, I know how to select effective teaching approaches to guide student thinking and learning in social studies.

The high level of attitudes towards the use of multimedia among the teachers is due to the high level of rating given by the respondents to the indicator's pedagogical knowledge, pedagogical content knowledge, technological pedagogical knowledge, technology pedagogy and content knowledge.

The result of this study is aligned with the statement that emphasizes teachers must not only have knowledge about technologies and how to use them, but also knowledge about pedagogy and content. The Technological Pedagogical and Content Knowledge Framework (TPACK) integrates these areas and provides a framework for analyzing the extent and quality of teachers' integration of these (Koehler & Mishra, 2009).

Education and technology cannot be considered independent of each other and the integration of technology into education has become a necessity. The integration of technology as a tool is used for enriching students' learning, better understanding of the lesson contents and developing higher order thinking skills. The integration of technology into education can be defined as the appropriate integration of the procedures of learning and teaching, including the evaluation of lessons and learning outcomes, with the technology that is suitable for the goals.

Level of Technology Proficiency of Teacher

Presented in Table 2 is the level of *Technology Proficiency of Teacher*. Computations revealed an overall mean score of 3.76 or *high,* indicating that all enumerated indicators were oftentimes manifested. The overall mean was the results obtained from the mean of the indicators for the specific items from the questionnaire intended for this particular indicator which is appended in this study.

Among the enumerated indicators, professional development and instruction obtained the highest rating with a mean score of 3.84 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: download and read e-books, save and retrieve files in a cloud-based environment, download and view streaming movies/video clips, use online tools to teach my students from a distance, and use mobile devices to connect to others for my professional development.

Emerging Technologies for Student Learning obtained a mean rating of 3.73 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: use social media tools for instruction in the classroom, teach in a one-to-one environment in which the students have their own device, integrate mobile technologies into my curriculum, find a way to use a smartphone in my classroom for student responses, and use mobile devices to have my students access learning activities.

Technology Proficiency obtained a mean score of 3.72 or high. As presented in the appended table, the mean ratings of the following items under this indicator were as follows: send a document as an attachment to an e-mail message, find primary sources of information on the Internet that I can use in my teaching, use the computer to create a slideshow presentation, create a lesson or unit that incorporates subject matter software as an integral part, and use technology to collaborate with other teachers or students who are distant from my classroom.

The high level of technology proficiency of teacher is due to the high level of rating given by the respondents to the indicator's technology proficiency, professional development and instruction, emerging technologies for student learning.

The results of this study is aligned with the statement Technology integration is widely considered one of the most important method used by teachers. Technology integration in classrooms refers to the enhancement of the educational environment with technology. Teachers can use technology to facilitate the learning process and employ different resources to motivate different learners.

Table 2. Technology Proficiency of Teacher

Indicators	SD	Mean	Descriptive Levels
Technology Proficiency	0.38	3.72	High
Professional Development and Instruction	0.46	3.84	High
Emerging Technologies for Student Learning	0.53	3.73	High
Overall	**0.40**	**3.76**	**High**

Technology proficiency is an individual's ability to use different software applications effectively. Teachers' capability and confidence, or lack thereof, when using different types of technology will affect technology integration in class. Namely, if the teacher lacks capability and confidence in using technology, the teacher will not be able to implement technology in class.

Correlations between Measures

Illustrated in Table 3 were the results of the test of relationship between the variables involved in the study. The overall correlation had a computed r- value of 0.526 with a probability value of 0.01 which is significant at 0.05 level rejecting the null hypothesis that there is no significant relationship between pedagogical content knowledge and technology proficiency of teacher. The significant relationship between the two variables is an indication that the increase in the level of pedagogical content knowledge led to the increase in technology proficiency of teacher.

There is a significant relationship between pedagogical content knowledge and technology proficiency of teachers. The result of this study is aligned with the statement that emphasizes many teachers use digital technologies in the teaching process and this is connected with a modern and successful school, which can well prepare its students for work and life in the knowledge society. Although many authors connect modernization of the educational process with digital technologies and their application in the teaching process, in agreement with authors are working within a framework that assumes equal importance to emphasis on the application of constructivist principles and the use of procedures and methods in the teaching process, which provide students with opportunities for spontaneous exploration, problem solving, examination of various phenomena by experiments,

Table 3. Significance on the Relationship between Pedagogical Content Knowledge and Technology Proficiency of Teacher

Pedagogical Content Knowledge	*Technology Proficiency of Teacher*			
	Technology Proficiency	Professional Development and Instruction	Emerging Technologies or Student Learning	**Overall**
Pedagogical Knowledge	-0.032 (0.218)	0.542* (0.001)	0.428* (0.000)	0.436* (0.000)
Pedagogical Content Knowledge	0.521* (0.004)	0.842* (0.000)	0.437* (0.000)	0.326* (0.000)
Technological Pedagogical Knowledge	0.523 (0.115)	0.964* (0.000)	0.853* (0.000)	0.488* (0.000)
Technology Pedagogy and Content Knowledge	0.631 (0.128)	0.636* (0.000)	0.047 (0.344)	0.325* (0.002)
Overall Differentiated Instruction	**0.248* (0.036)**	**0.449* (0.000)**	**0.438* (0.000)**	**0.386* (0.000)**

*Significant at 0.05 significance level.

discovering principles, and generalization on the basis of the above-mentioned cognitive activities.

Significance of the Influence of the Domain of Pedagogical Content Knowledge on Technology Proficiency of Teacher

Presented in Table 4 is the regression analysis showing the predictive ability of pedagogical content knowledge on technology proficiency of teacher. The analysis shows that when pedagogical content knowledge was regressed on technology proficiency of teacher, it generated an F-value of 36.84 with 0.01. The value of this regression is 36.84 with 0.01. It can be stated that pedagogical content knowledge influenced technology proficiency of teacher. Among the indicators of pedagogical content knowledge, only one gave significant influence on technology proficiency of teacher which is Pedagogical Content Knowledge, t=2.86, P=0.001.

Table 4. Regression Analysis Showing the Extent of the Influence of Predictor Variables on Technology Proficiency of Teacher

Technology Proficiency of Teacher Pedagogical Content Knowledge	**β (Standardized Coefficients)**	**B (Unstandardized Coefficients)**	**t**	**Sig.**
Constant	1.3106	0.4204	2.43	0.000
Pedagogical Knowledge	-0.96342	0.23954	-0.28	0.862
Pedagogical Content Knowledge	0.64297	0.76492	2.86	0.092
Technological Pedagogical Knowledge	0.97461	0.07631	0.26	0857
Technology Pedagogy and Content Knowledge	0.86427	0.08648	1.82	0.391
R	0.538			
R^2	0.528			
F	36.84			
p	0.000			

CONCLUSION

With considerations on the findings of the study, conclusions are drawn in this section. The level of pedagogical content knowledge is high, the level of technology proficiency of teacher is high, there is a significant relationship between pedagogical content knowledge and technology proficiency of teacher, the domains of pedagogical content knowledge that best influences technology proficiency of teacher is pedagogical content knowledge.

RECOMMENDATIONS

The results of this study revealed that the level of pedagogical content knowledge is high. The researcher recommends that the Schools Division Office of Davao Occidental may conduct training that will help improve the aspects of pedagogical knowledge, pedagogical content knowledge, technological pedagogical knowledge, technology pedagogy and content knowledge.

Meanwhile, the study revealed a high level of technology proficiency of teacher. The researcher recommends that the district office may provide Learning Action Cell among the teachers on the topic's technology proficiency, professional development and instruction, emerging technologies for student learning.

The study found a significant relationship between pedagogical content knowledge and technology proficiency of teacher. The researcher therefore recommends that the Department of Education may consider the provision of trainings or activities relative to the variables under study to help the school heads and teachers enhance on the indicators which are among the lowest in the indicators of the variables under study.

The study found that the domains of pedagogical content knowledge that best influences technology proficiency of teacher is pedagogical content knowledge. The researcher recommends that school heads may provide sessions in Learning Action Cell among teachers for improvement.

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