



Competencies and Pedagogical Content Knowledge in Technology Livelihood Education (TLE) Of Public Secondary Teachers in Davao Del Norte Division

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ABSTRACT

The study explored the relationship of competencies and pedagogical content knowledge of public secondary TLE teachers in Davao Del Norte Division. Also, it investigated the extent of competencies and pedagogical content knowledge of TLE teachers. With the use of probability sampling, 150 secondary teachers in the public schools were selected as the respondents. Utilizing the descriptive-correlational survey method, the data collated were analyzed through the use of Mean and Product-Moment correlation. Results revealed that there was an extensive competencies and an extensive pedagogical content knowledge among TLE teachers. Furthermore, there was a significant relationship between the two variables. Based on the findings, it was further suggested that higher officials in the Department of Education and school heads may identify means on how to help teachers in strengthening their competencies and pedagogical content knowledge in TLE for the welfare of the students.

Keywords: Competencies, pedagogical content knowledge, descriptive correlation, Davao Del Norte Division, Philippines

1. Introduction

The crux of effective teaching lies in pedagogical content knowledge (PCK), a pivotal amalgamation of a teacher's profound subject matter expertise and their adeptness in imparting that knowledge to cater to the diverse needs of learners. A teacher's proficiency in PCK involves not only a deep understanding of the subject matter but also the skill to adapt instructional strategies, anticipate student misconceptions, and create meaningful learning experiences. However, Technical-Vocational-Livelihood (TVL) teachers often face challenges in developing robust pedagogical content knowledge due to the dynamic and specialized nature of vocational subjects. Issues may arise from a lack of specific professional development opportunities tailored to enhance both their technical expertise and instructional skills, hindering their ability to effectively bridge the gap between theoretical knowledge and practical application in the classroom.

In Indonesia, Suharno et al. (2020) revealed that some of the challenges faced by the TVL teachers were the inadequate facilities, teachers and [industry](#) support. In addition, 74% of students were bored during learning due to the numerous social lessons. Moreover, the establishment of a new school was not balanced with a feasibility study, and this resulted in graduates finding it difficult to get a job. They learned approaches which tended to be theoretical and less relevant in the labour market. The high unemployment of vocational school graduates, inconsistent policies, inadequate teacher competencies, and weak support are crucial issues that have been criticized as industries employing the graduates require not only academic competencies, but also skills at work.

In the Philippines, Benitez et al. (2022) revealed that that the more problems the TVL teachers have encountered, the more the students are not ready to take the national competency assessment. Some students are tardy, passive in the classroom, and perform poorly during the assessment. Lack of necessary teaching materials and an unfavorable classroom environment are encountered by the TVL teachers. More so, Rusiana and Flores (2019) claimed that several tools and equipment needed to teach TVL were unavailable. The study revealed that the lack of teaching tools and equipment could negatively affect students' learning and performance (Ugbo, 2014). In addition, Dahlan and Eissa (2015) emphasized the importance of having good lighting because it can improve students' vision and perception and contributes to students' health, comfort, and productivity.

In the Division of Davao del Norte, it was observed that TVL teachers encountered several challenges in developing their pedagogical content knowledge. One common issue was the limited availability of specialized professional development programs that integrated both technical expertise and effective teaching strategies. Additionally, the dynamic nature of vocational subjects posed difficulties for TVL teachers in adapting instructional approaches to align with industry changes, potentially impacting their ability to provide students with relevant and up-to-date knowledge and skills.

However, these were purely observations and were not validated by academic research. This somehow motivated the researcher to purely explore the extent of the pedagogical content knowledge of teachers considering their competencies in TVL. Furthermore, this investigated the relationship of the two variables. Throughout this academic endeavor, the researcher provided meaningful insights that can assist policymakers in shaping policies, programs, interventions, projects, and activities focused on improving both the competencies and pedagogical content knowledge of TVL teachers. This research journey was also intended to benefit the wider school community. Furthermore, the researcher had plans to share the study's findings in international forums and publish them in a Scopus-Indexed journal.

This study was anchored on the Environmental Habit Theory of Prosser and Quigley (1950) and Ability, Motivation, and Opportunity, (AMO) Theory of Appelbaum et al., (2000). The Environmental Habit Theory of Prosser and Quigley (1950) suggested that teaching vocational education will be effective if the teacher has experience in applying skills and knowledge to operate materials and work processes (Suyitno et al., 2022). The theory emphasized the developing vocational education based on workplace situations (Suyitno et al., 2022). It reveals the situations and influences affecting the development of skills important for work accomplishment with exact jobs and basic tools and machinery encouraged to be used (Ikeoji & Agbidi, 2015).

Furthermore, the Environmental Habit Theory espoused the importance of the learning environment in teaching vocational education (Mayuga, 2022). It emphasized that vocational education would be efficient if the learner training environment replicates the setting where the learner must work. It considered the teachers' instructional technique as important in teaching vocational education (Oyenuga & Olakotan, 2022). It also suggested applying a repeated and continuous pattern of thinking and practicing in vocational education (Niswah & Rejekiningsih, 2022).

Moreover, the Ability, Motivation, and Opportunity (AMO) Theory of Appelbaum et al., (2000) espoused that organizational performance is served by employees who can do tasks, have the skills and knowledge, are motivated to work, and could organize their skills in doing their tasks. AMO theory argued that teachers' professional development is the combined effect of personal ability, motivation, and perceived opportunity. There were several methods to enhance ability, motivation, and opportunity as suggested. These suggested enhancement practices are for ability, staffing, and professional development; motivation, performance appraisal, and reward systems; and opportunity, job design, and participation (Chen & Chen, 2022).

The two aspects of instruction are teaching and learning. To be efficient and effective, the teacher must possess teaching competency and pedagogical content knowledge. A teacher's competencies involve a related set of knowledge, skills, and attitude that enables her/him to effectively perform responsibility. Knowledge alone is not sufficient for assuring success in the classroom. A teacher must possess a sense of caring and competencies that includes a focus on their own personal and professional development as well as attention to the various needs of their students. Pedagogical content knowledge conceptualizes the ways of representing and formulating subject that makes comprehensible to others. Pedagogical content knowledge is also a unique form of knowledge for teaching which is based on subject matter knowledge, knowledge of potential student learning difficulties, and students' prior knowledge of specific concepts (Guerriero, 2014).

The competency of teachers is an essential element that they need to have in striving toward excellence (Buyon, Mohamed, Satari, Bakar, & Yunus, 2020). To be competent and professional educators, teachers must master pedagogical knowledge (Dwyer & Schachter 2020). Teachers can significantly influence students' views and values; hence, it is critical to assess teachers' skills in current settings. Instructors must modify their educational approaches to accommodate the new type of learner that they are experiencing in this new generation of learners (Sain, Kaware, & Douglas, 2018). This collection of knowledge and pedagogy can be referred to as teacher competencies, or the experience, talents, and attitudes that enable employees to carry out their duties as effectively as possible (Caena & Redecker, 2019).

2. Methodology

Research Design

This study adopted a quantitative research approach, specifically employing a descriptive correlational method. Quantitative research involves the examination of a specific group of individuals, known as a sample population, through the utilization of observed or measured data to address inquiries about this population. Social scientists, including communication researchers, utilize quantitative research to observe phenomena or events affecting individuals, with the aim of constructing knowledge and improving understanding of the social world (Allen, 2017). Additionally, a descriptive correlational study aims to outline relationships between variables without attempting to establish a causal connection (Noah, 2021). This research fell under the quantitative classification as it utilized numerical data for analysis and interpretation. It took on a descriptive nature, aimed to determine the extent of competencies and pedagogical content knowledge among TLE teachers. Additionally, this academic undertaking was considered correlational because its goal was to assess the relationship between the competencies and pedagogical content knowledge of TLE teachers in public secondary schools within the Davao del Norte Division.

Research Respondents

This research involved 150 TLE teachers from public secondary schools in the Division of Davao del Norte. As stipulated by Hair et al. (2018), it was recommended that a minimum of 50 samples was needed for simple regression analysis, and approximately 100 samples were generally deemed suitable for most research situations. Thus, having 150 respondents surpassed the required threshold, ensuring the adequacy of the study's objectives. Regarding the inclusion and exclusion criteria, this study selected public secondary TLE teachers with a minimum of 2 years of teaching experience. This criterion was established because their two-year tenure in public schools provides them with a substantial basis for evaluating their competencies and pedagogical content knowledge in TLE. Additionally, participants who felt uneasy or uncomfortable while responding to the survey questionnaire had the option to

voluntarily withdraw from the study. They did not face any pressure or obligation to participate, and their decision to withdraw was fully respected, underscoring the paramount importance of prioritizing the well-being and comfort of the respondents in the study's execution.

Research Instruments

Concerning the method of data collection, this study utilized a modified survey questionnaire, which was divided into two separate sets. The first set focused on evaluating the competencies of TLE teachers, while the second set centered around assessing the pedagogical content knowledge of TLE teachers.

The competencies of TLE teachers questionnaire was adapted from Calanog (2021). The tool had a total of 20 items. It had four indicators, namely: competencies in Home Economics (1-5), competencies in Industrial Arts (1-5), competencies in Information and Communications Technology (1-5), and competencies in Agri-Fishery Arts (1-5). The questionnaire was subjected to a pilot testing having a result of .76 suggesting that the items have relatively *high* internal consistency.

The pedagogical content knowledge of teachers questionnaire was adapted from Palaca and Oliva (2023). The instrument consisted of 16 items. It had the following indicators, namely: student (1-4), teaching and classroom processes (1-2), theories of assessment (1-5), and professional responsibilities (1-5). The questionnaire was subjected to a pilot testing having a result of .74 suggesting that the items have relatively *high* internal consistency.

The tool employed in this study was customized to align with the study's objectives. The researcher integrated and amalgamated all feedback, comments, and suggestions from the advisor, panel members, and expert validators to improve and refine the research instrument, with the ultimate goal of achieving construct validity.

Table

Table 1

Summary on the Extent of Competencies of TLE Teachers

No	Indicators	Mean	Descriptive Equivalent
1	Competencies in Home Economics	3.58	Extensive
2	Competencies in Industrial Arts	3.50	Extensive
3	Competencies in Agri-Fishery Arts	3.57	Extensive
4	Competencies in Information and Communications Technology	3.62	Extensive
Overall		3.57	Extensive

Table 1 provides the summary on the extent of competencies of TLE teachers. It is exhibited that the overall mean of competencies of TLE teachers is 3.57, which is in an extensive level. This means that competencies of TLE teachers is oftentimes evident.

Data show that all four (4) indicators are in an extensive level. As arranged chronologically, competencies in information and communications technology has the highest mean score (3.62). This is followed by competencies in home economics (3.58), competencies in agri-fishery arts (3.57), and competencies in industrial arts (3.50).

The results underscore that the competencies of TLE (Technology and Livelihood Education) teachers are consistently evident across multiple domains. The data reveal an extensive level of competencies as indicated by all four indicators. Notably, competencies in information and communications technology emerge as the highest suggesting a robust proficiency in leveraging technological tools for educational purposes. Following closely are competencies in home economics demonstrating a high level of expertise in this domain. Competencies in agri-fishery arts and competencies in industrial arts also exhibit considerable strength. The chronological arrangement of these competencies indicates that TLE teachers excel across a diverse range of subjects, showcasing a comprehensive skill set that extends beyond traditional academic domains. This broad expertise positions TLE teachers to provide students with a well-rounded and practical education that aligns with the demands of various livelihood pathways.

The extensive competencies of TLE teachers align with the well-established perspective emphasized by Ryan (2019), underlining the significance of teachers' understanding in three key areas: subject matter knowledge, pedagogical knowledge, and curricular knowledge. Building upon this, Habiaryemye et al. (2022) broadened the concept of content knowledge to encompass subject matter knowledge, curricular knowledge, and introduced the sub-category of pedagogical content knowledge. Furthermore, Ritzhaupt and Kumar (2015) identified at least seven knowledge bases crucial for effective teaching, including content knowledge, pedagogical knowledge, curricular knowledge, pedagogical content knowledge, knowledge of students, knowledge of context, and knowledge of educational goals (Nworie, 2022).

According to Fuente and Bias (2020), TLE teachers exhibit a higher proficiency in information and communication technology compared to teachers in other subjects. Their aptitude for inspiring students to generate connections across subjects received the highest rating. The competencies of the new

generation of teachers may be on par with those of experienced teachers, particularly in TLE, where teachers demonstrate experience across the majority of competencies.

D'Angelo (2018) pointed out that the educational curriculum continually evolves, especially with the introduction of the K to 12 curriculum. A crucial aspect of this pedagogical shift is the significant role played by Technology and Livelihood Education (TLE). Basal (2022) asserted that TLE is one of the eight learning areas integrated into the K to 12 curriculum. It emphasizes knowledge, processes, work values, and life skills within agri-fishery arts, home economics, industrial arts, and information and communication technology (ICT). The effectiveness of TLE hinges on the mastery of knowledge, skills, and the development of appropriate work values and attitudes.

Table 2

Summary on the Extent of Pedagogical Content Knowledge of TLE Teachers

No	Indicators	Mean	Descriptive Equivalent
1	Student	3.60	Extensive
2	Teaching and Classroom Processes	3.64	Extensive
3	Theories of Assessment	3.71	Extensive
4	Professional Responsibilities	3.72	Extensive
Overall		3.67	Extensive

Table 2 provides the summary on the extent of pedagogical content knowledge of TLE teachers. It is exhibited that the overall mean of pedagogical content knowledge of TLE teachers is 3.67, which is in an extensive level. This means that the pedagogical content knowledge of TLE teachers is oftentimes evident.

Data show that all four (4) indicators are in an extensive level. As arranged chronologically, professional responsibilities has the highest mean score (3.72). This is followed by theories of assessment (3.71), teaching and classroom processes (3.64), and student (3.60).

The findings suggest that the pedagogical content knowledge of TLE (Technology and Livelihood Education) teachers is frequently evident across various dimensions. The data indicate an extensive level of proficiency as reflected in all four indicators. When arranged chronologically, professional responsibilities emerge as the highest showcasing TLE teachers' effectiveness in adhering to protocols, demonstrating good judgment, and maintaining accurate records in their professional roles. The subsequent indicators also exhibit robust proficiency, with theories of assessment highlighting TLE teachers' adeptness in using assessment strategies to diagnose learning needs and encourage student goal-setting. Teaching and classroom processes follow closely emphasizing TLE teachers' skills in employing diverse teaching methods and maintaining order. Finally, the student indicator showcasing TLE teachers' effectiveness in using motivational strategies and integrating real-life situations into lessons, contributing to students' meaningful understanding and connections. These results collectively underscore the comprehensive and well-rounded pedagogical content knowledge demonstrated by TLE teachers. The favorable findings of this study supported the findings of Sri et al., (2021) highlighting that the category of pedagogical content knowledge includes the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations and demonstration in a word, ways of representing and formulating the subject that make it comprehensible to others. Pedagogical content knowledge also includes an understanding of what makes the learning of specific topic easy or difficult; the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons.

Kapur (2019) contended that the absence of modern teaching and learning resources makes the teaching process challenging to perceive. The incorporation of these resources enhances the learning experience, making it more engaging, contemporary, and appealing. Additionally, Veerunjaysingh (2022) highlighted the importance of possessing skills and knowledge in utilizing teaching-learning materials to ensure the effective utilization of educational resources, which are often found to be inadequate. The study further emphasized that institutions comprise both human and non-human resources, including facilities, infrastructures, and teaching-learning materials, aiding teachers in realizing their pedagogical content knowledge.

Ingusci et al. (2016) asserted that educators play a pivotal role in reshaping pedagogical approaches to elevate the quality of education. To attain this educational quality, Nair (2020) stressed that a significant pedagogical content knowledge (PCK) must be complemented by perceived organizational support (POS). Correlation between perceived organizational support and pedagogical content knowledge has been identified as a driving force motivating teachers to engage in effective teaching activities. Omar (2016) suggested that organizational partnership positively influences teachers' intrinsic motivation and work effort.

Table 3

Significance of the Relationship Between Competencies of Teachers and Pedagogical Content Knowledge of TLE Teachers

Competencies of TLE Teachers Indicators	Dependent Variable	r-value	p-value	Decision on Ho	Significance Level
Competencies in Home Economics		0.439	0.000	Rejected	
Competencies in Industrial Arts		0.430	0.000	Rejected	$r = .437 > .05$
	Pedagogical Content Knowledge of the TLE Teachers				Moderate Positive Correlation
Competencies in Agri-Fishery Arts		0.435	0.000	Rejected	
Competencies in Information and Communications Technology		0.442	0.000	Rejected	
Overall		0.437*	0.000	Rejected	

*Significant at 0.05 significance level.

Presented in Table 3 are the data on the significance of the relationship between competence of TLE and pedagogical content knowledge of TLE teachers. Reflected in the hypothesis, the relationship was tested at 0.05 level of significance. The overall r-value of .437 with a p-value of <0.05 signified the rejection of the null hypothesis. It means that there is a significant relationship between competence of teachers and pedagogical content knowledge of TLE teachers. This shows that competence of teachers is correlated with the pedagogical content knowledge of TLE teachers.

Doing a pairwise correlation among the measures of both variables, it can be gleaned that competencies in home economic, competencies in industrial arts, competencies in agri-fishery arts, and competencies in information and communications technology revealed computed r-values of 0.439, 0.430, 0.435, and 0.442 respectively with p-values which are less than 0.05 in the level of significance. This implies that as competencies in home economic, competencies in industrial arts, competencies in agri-fishery arts, and competencies in information and communications technology increase, the pedagogical content knowledge of TLE teachers increases.

The statistical analysis yielded an overall r-value of 0.437 with a p-value <0.05 , leading to the rejection of the null hypothesis and indicating a significant relationship between the competence of teachers and the pedagogical content knowledge of TLE (Technology and Livelihood Education) teachers. This finding suggests that there is a correlation between teachers' competencies and their pedagogical content knowledge in the TLE domain. Further examination through pairwise correlation among specific competency areas—such as home economics, industrial arts, agri-fishery arts, and information and communications technology—revealed p-values which are less than 0.05. This implies that an increase in competencies in these specific areas is associated with an increase in the pedagogical content knowledge of TLE teachers, reinforcing the idea that teachers' overall competence is linked to their effectiveness in delivering pedagogical content within the TLE curriculum.

The findings align with the research conducted by Ocak and Karafil (2021), highlighting the significance of teachers having technical skills and competencies in technology-related subjects. Their study underscored that teachers' proficiency in the technical aspects of Technology and Livelihood Education (TLE) is crucial for delivering effective classroom instruction, consistent with the broader concept of subject matter expertise within the Pedagogical Content Knowledge (PCK) framework.

Examining the distinct requirements of Technology and Livelihood Education (TLE), Kurt (2018) explored the significance of teachers' Technological Pedagogical Content Knowledge (TPACK) in seamlessly incorporating technology into the teaching and learning process. Their research emphasizes that TLE educators should not only excel in the technical facets of technology but also demonstrate the knowledge and skills to integrate it effectively into their pedagogical practices.

Basal (2022) highlighted the need for teachers to incorporate knowledge from various domains. Additionally, Saeleset and Friedrichsen (2021) further emphasized that teachers with integrated knowledge, especially within the realm of Technology and Livelihood Education (TLE), exhibit enhanced capabilities to design and impart lessons that cultivate comprehensive and integrated understanding among students. This integration plays a pivotal role in preparing students for the professional world, aligning with the competencies essential in TLE.

In addition, Nicholson (2022) indicated that pedagogy encompasses not only the performance of teaching but also the theories, policies, beliefs, and controversies that inform it. In the context of TLE, this implies that teachers' pedagogical content knowledge (PCK) involves understanding that teaching is interconnected with various concepts and factors, including lesson plan development, classroom management, and learner assessment.

Conclusions

Based on the findings of this study, the following conclusions were offered:

The extent of competencies of TLE teachers of the public secondary schools implies that it is oftentimes evident. In fact, all dimensions are oftentimes evident from the TLE teachers, namely, competencies in home economic, competencies in industrial arts, competencies in agri-fishery arts, and competencies in information and communications technology. Meanwhile, the extent of pedagogical content knowledge of the TLE teachers is oftentimes evident. Apparently, all indicators are found to be oftentimes evident specifically on student, teaching and classroom practice, theories of assessment, and professional responsibilities. Based on the findings, competencies and pedagogical content knowledge of the TLE teachers are related. All domains of competencies of TLE teachers are linked to the pedagogical content knowledge of the TLE teachers. This leads to the rejection of the null hypothesis.

Recommendations

The following suggestions were offered based on the conclusions of the study:

Based on the extensive competencies and pedagogical content knowledge observed among TLE teachers in public secondary schools, it is recommended that DepEd officials continue to invest in comprehensive professional development programs. These programs may be designed to further enhance the existing competencies of TLE teachers, particularly in domains such as home economics, industrial arts, agri-fishery arts, and information and communications technology. Furthermore, the curriculum and training initiatives may emphasize the integration of practical and innovative teaching methodologies that align with the diverse needs of students. Continuous support and resources should be provided to sustain the positive pedagogical content knowledge levels exhibited by TLE teachers. This approach ensures that TLE educators remain well-equipped to deliver quality education and effectively prepare students for real-world challenges in their chosen fields.

Moreover, school principals may actively support and encourage ongoing professional development opportunities for their TLE staff. Principals may collaborate with the education department to identify specific areas of competence that may benefit from targeted training and workshops. Additionally, fostering a culture of continuous learning within the school, where teachers can share best practices and innovative teaching methods, may contribute to further enriching pedagogical content knowledge. Principals may recognize and celebrate the strengths of TLE teachers, creating an environment that values their expertise and encourages a dynamic exchange of ideas.

Furthermore, teachers may actively engage in continuous professional development opportunities to stay abreast of emerging trends, technologies, and pedagogical approaches in their respective fields. Collaborating with colleagues to share successful teaching strategies and participating in workshops or conferences may further enhance their instructional skills. Additionally, considering mentorship roles for experienced TLE teachers to guide and support their peers may contribute to the collective growth of the teaching community.

Lastly, future researchers are encouraged to delve deeper into specific factors that contribute to the observed relationships. Investigating the impact of targeted professional development programs, mentorship initiatives, or innovative teaching methodologies on the enhancement of TLE teachers' competencies and pedagogical content knowledge may provide valuable insights. Employing mixed-methods research designs or longitudinal studies could offer a nuanced perspective on the sustained development of TLE teachers' competencies and pedagogical practices over time. This thorough exploration will contribute to the refinement of educational strategies and policies aimed at fostering continuous improvement among TLE educators.

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