

Technology and Livelihood Education (TLEd) Preservice Teachers' TPACK: Design and Development

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ABSTRACT

The study aimed to conduct a descriptive study that will determine the Technological Pedagogical Content Knowledge (TPACK) capabilities of TLEd preservice teachers. The developmental design in the study was used with 36 respondents who were selected from 42 TLEd preservice teachers using total population sampling. The 36 respondents were administered an adopted questionnaire, and 6 were selected for focus group discussion. Based on the results of the study: (1) the TPACK capabilities of the TLEd preservice teachers are present most of the time, hence, there is a need for further enhancement; (2) appropriateness, skills in learning, and interaction should be emphasized in the curriculum enhancement of different course subjects concerning integrating technology, and; (3) the technology training towards the TLEd preservice teachers should focus on the considerations and tools. With the results, there is a need to conduct technology training among TLEd preservice teachers using at least 1-2 platforms. Technology training, based on the results, will teach the preservice teachers to maximize the different tools available. The platforms utilized should consider the different factors that might inhibit the students or preservice teachers from using them.

Key Words: technology and livelihood education, pre-service teachers, TPACK

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INTRODUCTION

Students are growing up with new technologies, perceiving that technology is considered a perfect tool in combating different problems. However, Tondeur, van Braak, Siddiq, and Scherer (2016) argue that access to technology does not mean effective use of technology in education. Teachers are critical players in enhancing student learning with technology-enhanced classroom practices. Thus, there is a need to prepare future teachers to integrate technology in their educational practice (Liu, 2016; Ottenbreit Leftwich, Glazewski, Newby, & Etmer, 2010). To do this, higher education institutions need to help them bridge the gap between technology, pedagogy, and content knowledge (TPACK). Koehler and Mishra (2009) argue that for technology integration to occur in education, teachers must be competent in these three forms of knowledge, but more importantly, they must be able to integrate all three types of knowledge (Sang, Tondeur, & Chai, 2014; Schmidt *et al.*, 2009). TPACK emphasizes the importance of preparing preservice teachers to make sensible choices in their uses of technology when teaching particular content to a specific target group.

Inherent with the TPACK capabilities is the incorporation of blended learning, especially in TLE subjects. Boelens, De Wever, & Voet (2017) that designing blended learning environments have been challenging in the higher education because there are several points to consider; hence, making sure that blended learning is considered as one of the ways in meeting the TPACK capabilities of teachers. They mentioned that the students and teachers find it challenging to foster flexibility. They also mentioned that stimulating engagement and improving academic self-efficacy both on the virtual and face to face platform is challenging. Fostering an affective learning climate and facilitating the students' learning processes are also the challenges (Fresen, 2018). Medina (2018) also mentioned that there have been several challenges in the delivery of instruction and pedagogy, especially with the used of the blended learning modality; hence, affecting the way students engage with other students and other pieces of information. Adekola, Dale, and Gardiner (2017) mentioned that the teaching-learning needs of the students are changing, especially by the way they engage with others and the way they engage in different pieces of information with respect to the place, pace, and time. Suartama, Setyosari, & Ulfa (2019) made sure that in higher education, blended learning modality is well-executed; hence, deploying a blended learning framework that will allow learners to acquire different pieces of information not just in computers but also in the respective mobile devices, which will allow them to enjoy learning irrespective of the place and convenience. Then researchers made use of a framework to make sure that blended learning modality will be able to help cater the needs of the students. On the other hand, the blended learning modality has also found several issues on self-regulation and the use of technology for studying (Rasheed, Kamsin, & Abdullah, 2020), which played a huge challenge for students, teachers, and educational institutions to cope with the several changes that are present in the 21st century. Internationally, because of the pandemic that is happening, blended learning doesn't become successful in terms of engagement and academic self-efficacy when peer instruction and flipped learning is not considered (Nerantzi, 2020).

Studies showed that integrating technology in education is challenging, complex and required strategic planning by the policy and decision makers (Hashim, 2007; Ghavifekr & Sufean, 2010). Moreover, Moonen (2008), stated that it is not difficult to have policies for IT (Information Technology) integration accepted for core technologies than for complementary technologies, which leaves technology isolated from integration while teaching other subjects; a concern for the teachers.

Objectives :

This study sought to ascertain how preservice teachers' TPACK was developed. Specifically, this study answered the following questions:

- a) What is the level of the TLEd preservice teachers' TPACK capabilities?
- b) What curriculum enrichment could be offered to enhance the Technology courses of the TLEd preservice teachers; and
- c) What technology training could be offered to TLEd preservice teachers to enhance their TPACK?

RELATED LITERATURE

This section presents the literature of the variables under consideration. The presentation proceeds in this sequence: (a) TPACK defined, (b) the importance of TPACK development, and (c) modalities use in TPACK development.

TPACK defined. The following terms are defined as they are utilized in the study, to wit:

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.

Technology Knowledge (TK) refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs.

Content Knowledge (CK) is the “knowledge about actual subject matter that is to be learned or taught” (Mishra, p. 1026). Teachers must know about the content they are going to teach and how the nature of knowledge is different for various content areas.

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

Pedagogical Content Knowledge (PCK) is the knowledge the teachers have about their content and the knowledge they have about how to teach the specific content. This idea suggests different strategies that science teachers use as compared to the strategies used by language arts teachers, or teaching strategies used by art teachers as opposed to teachers of mathematics. This specialized knowledge allows teachers to use the most effective methods for teaching specific content (Shumanm, 1986 in Educational Technology, n.d.).

Technological Pedagogical Knowledge (TPK) is the set of skills (Mishra & Kohler, 2006 in Educational Technology, n.d.), which teachers develop to identify the best technology to support a particular pedagogical approach. For instance, teachers may want their students to work in collaborative groups (pedagogy); they might choose to have them share their learning in a wiki (a digital tool that is collaborative) or communicate what they have learned in a multimodal presentation like, PowerPoint, Glogster or Prezi (digital tools that allow students to present what they know).

Technological Content Knowledge (TCK) is the set of skills, (Mishra & Kohler, 2006 in Educational Technology, n.d.), which teachers acquire to help identify the best technologies to support their students as they learn content. For instance if teachers wanted their students to recognise and understand the sequence of steps leading up to a hurricane (content) they would look for online hurricane tracking sites, allow students to find photographs that represented the formation of hurricanes and have students document the different stages in a timeline.

Preservice teachers' TPACK capabilities. Archambault and Crippen (2009) investigated the TPACK competency of 596 teachers who taught online. The study found that although their content and pedagogical knowledge was high, their technological knowledge was lacking and it was also concluded that this deficiency decreased their self-confidence. In another study, Jang and Tsai (2012) investigated the differences between mathematics and science teachers' TPACK and found that mathematics teachers have significantly lower TPACK than science teachers. The authors explain that the result may be because science teachers tend to use more technological tools and approaches in their classes than mathematics teachers. The field of mathematics is one of the oldest sciences and has been taught since long before modern technologies were developed. Mathematics teachers may not feel the need to use technology for teaching math and this may explain their low TPACK levels (Jang & Tsai, 2012). These findings reveal that preservice teachers' TPACK development has a long way to go in terms of research.

CONCEPTUAL FRAMEWORK

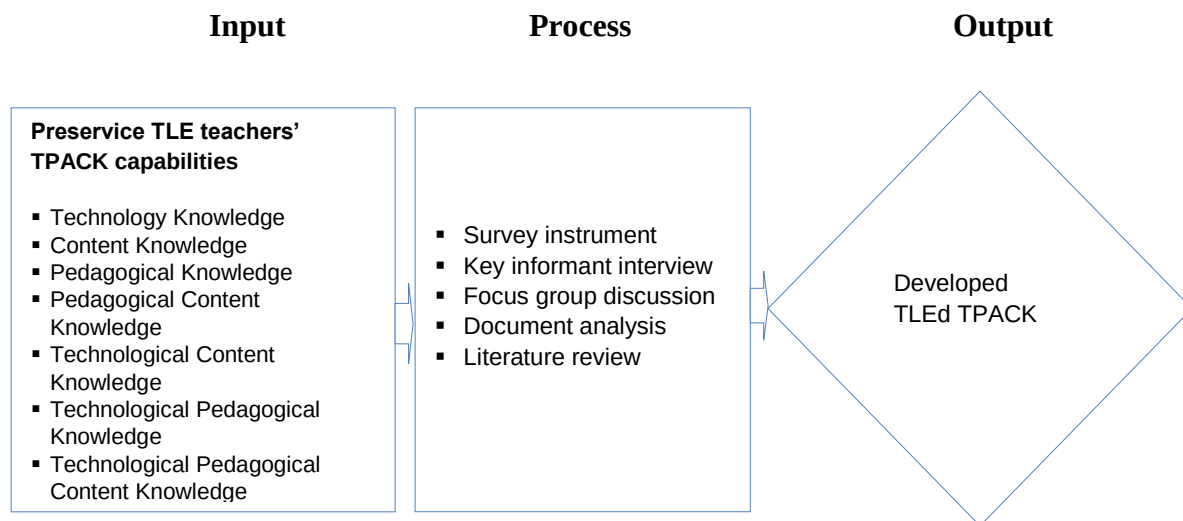


Figure 3. Conceptual framework of the study.

METHODOLOGY

Research Design

This study made use of a developmental research design. Developmental research has been defined as “*the systematic study of designing, developing and evaluating instructional programs, processes and products that must meet the criteria of internal consistency and effectiveness*” (Seels & Richey, 1994, p.127). In its simplest form, developmental research could be either: a situation in which someone is performing instructional design, development, or evaluation activities and studying the process at the same time; or the study of the impact of someone else's instructional design and development efforts; or the study of the instructional

design, development, and evaluation process as a whole, or of particular process components (Seels & Richey, 1994).

This research design is appropriate because the study aimed to develop a TPACK to be utilized in the teaching and learning of the TLEd subject. Development is *“the process of translating the design specifications into physical form”* (Seels & Richey, 1994, p. 35). In other words, it refers to the process of producing instructional materials. In the present study the materials to be produced are the TPACK of the respondents. Heinich, Molenda, Russell and Smaldino (1996) define instructional development as *“the process of analyzing needs, determining what content must be mastered, establishing educational goals, designing materials to reach the objectives, and trying out and revising the program in terms of learner achievement”* (p. 410).

Respondents

The respondents of the study would be the preservice teachers of BTLEd program in the college of education. There would be 42 TLE preservice teachers. The descriptive results of the study will enable the researchers to make efforts in designing and developing the TPACK intended for the preservice teachers.

Sampling Design

This study will use universal or total population sampling design. Total population sampling is a type of purposive sampling technique where the researcher chooses to examine the entire population (*i.e.*, the total population) that have a particular set of characteristics (Laerd Dissertation, 2012). In the present study, the total population means those preservice teachers of a state run university, the 36 respondents were used to answer the google form constructed quantitative questionnaire the remaining 6 students were utilized and assigned in the focus group discussion for qualitative aspect.

Research Instrument

To measure the preservice TLE teachers TPACK, a tool is adopted from Schmidt's (2009), study entitled, *“Survey of Preservice Teachers' Knowledge of Teaching and Technology.”* Administered on Google Forms is the adopted TPACK questionnaire. In addition, as it is patterned on 5-point Likert's scale, there were designated values to determine the overall responses of the respondents on different specifications. Separate group of respondents of 6 students were used for focus group discussion.

Data Gathering Procedure

The following steps were adhered to in gathering the needed data:

Requesting permission for the conduct of the study. Letters were written addressed to the Dean of the College of Education requesting permission for the conduct of the study.

Administering the survey questionnaire. The researcher personally administer the survey questionnaire to the preservice teachers through google forms.

Conduct of the focus group discussion (FGD) and semi-structured interview. Of the total number of preservice teacher respondents who responded to the survey questionnaire; only six (6) were invited to participate in the focus group discussion. The FGD was repeated until such time that data saturation was evident, in this case after two (2) sessions, it was evident that the responses of the respondents to the probing questions were repeatedly underscored.

Transcribing of the minutes of the FGD. Every after FGD, the minutes were transcribed for ease of data analysis.

Data Analysis

Data treatment in a mixed method study requires the separate analysis of quantitative and qualitative data. The data were subsequently combined and interpreted to inform the study. The analysis of qualitative and quantitative data follows similar steps. Preparing the data for analysis, exploring the data, analyzing the data, representing the analysis, interpreting the analysis, and validating the data interpretations are identified as necessary steps in analyzing and interpreting mixed methods research (Creswell & Plano Clark, 2011).

In this study, responses to survey questions were analyzed separately from focus group and interview responses. To treat the quantitative data, mean and standard deviation was used. Mean is the arithmetic average of the scores. Alternatively, the standard deviation illustrates the dissemination of scores around the mean. The smaller the standard deviation, the more constricted the range between the lowest and highest scores, put simply, that the scores band closely to the average score. Moreover, standard deviation shows the index of variability; a single number that conveys the variability, or spread, of a distribution of scores. In the present investigation, this was used to provide a description of the preservice and inservice English teachers' understanding of the TPACK.

On the other hand, to treat the qualitative data, the researcher transcribed the narrative data from the focus group discussion and interviews. Manual coding was done to reveal the themes. Hedlund-de Witt (2013) argued that coding is an interpretive act that represents the transitional process between data collection and more extensive data analysis. The author describes it as generating the bones of the analysis and the integration assembles those bones into a working skeleton. Likewise, the qualitative approach of thematic analysis was used. Thematic analysis identifies, analyzes, and reports patterns within the data. This approach produces an insightful analysis that meets the research objectives. Moreover, this supplemented the research

objectives by facilitating an examination of the data from two perspectives: first, from the data-driven and coding in an inductive way; second from the research questions to reveal if the data were consistent with the research objectives and if it provided sufficient information (Jugder, 2016). In the present research activity, this was done to reveal the preservice and inservice English teachers' classroom practices in terms of technology integration, as well as the development of a TPACK model.

SUMMARY OF FINDINGS:

1. The technological knowledge, content knowledge, pedagogical knowledge, pedagogical knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge, and technological pedagogical and content knowledge of TLED preservice teachers are observed most of the times but not always. Overall, their TPACK capabilities are present most of the times;
2. The TLED preservice teachers are calling for curriculum enhancement to Technology courses in terms of appropriateness, skills in learning, and individual and group interaction; and,
3. The TLED preservice teachers emphasized the considerations and tools to enhance their TPACK capabilities.

CONCLUSION:

1. The TPACK capabilities of the TLED preservice teachers are present most of the times; hence, there is a need for further enhancement;
2. Appropriateness, skills in learning, and interaction should be emphasized in the curriculum enhance of different course subjects with respect to integrating technology; and,
3. The technology training towards the TLED preservice teachers should focus on the considerations and tools.

RECOMMENDATION:

1. There is a need to conduct a technology training embedded on different subject areas of TLED preservice teachers;
2. The curriculum of TLE should only use at least 1-2 platforms to also teach the preservice teachers in maximizing the different tools; and,
3. The platforms utilized should take into consideration the different factors that might inhibit the students or preservice teachers from using it.

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