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Pre-service Teachers' Mastery of Technological Pedagogical Content Knowledge for Teaching English Language

Charanjit Kaur Swaran Singh*, Zulkharnain Mohd Kasim

Department of English Language & Literature, Faculty of Languages & Communication, Universiti Pendidikan Sultan Idris, Malaysia

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Abstract Education 4.0 is the inspiration of the Malaysia Education Blueprint 2015-2025 which is focusing on teaching and learning especially in terms of personalization of learning, quality education and learners as connectors, creators, and constructivist (*Kementerian Pendidikan Malaysia*, 2015). Pre-service teachers' mastery of the technological pedagogical content knowledge for teaching practice is deemed crucial in order for them to face the challenges apparent in the Industrial Revolution 4.0. The purpose of this study is to investigate how the mastery of TPACK assists the pre-service English teachers with their teaching practice. The research design was mainly qualitative. Four ESL pre-service teachers were selected using the purposive sampling method. Each teacher was observed five times over a period of twenty lessons. Non-participant observation was conducted during the teaching sessions. A checklist was used during the observation to ensure uniformity in the elements observed during each lesson. Findings of the study clearly revealed that the pre-service teachers have a substantial understanding and mastery of TPACK. The pre-service teachers revealed some effective technological pedagogical content knowledge strategies used for teaching purposes to capture students' interest to make learning more fun and meaningful.

Keywords Teaching Practice, TPACK, Pre-service Teachers

I. Introduction

Education 4.0 is the inspiration of the Malaysia Education Blueprint [1] which is focusing on teaching and learning especially in terms of personalization of learning, quality education and learners as connectors, creators, and constructivists [1]. Pre-service teachers must equip themselves with the current technological, pedagogical, and content knowledge (TPACK) so that they can disseminate quality teaching to produce quality students in the future. Pre-service teachers must keep abreast with the current education reform to advance in making pedagogical decisions and providing pedagogical reasoning for classroom actions. Some changes or paradigm shifts need to be made to the pedagogies in response to the new developments in educational thinking related to 21st century learning and teaching. Major shift in education 4.0 demands for teachers to employ student-centred approach that will empower students to interact with their peers, co-construct new knowledge through discussions in the classroom that will create opportunity for the students to solve problems creatively and critically. Pre-service teachers must demonstrate appropriate content-pedagogical expertise to cater to the needs of mixed abilities students in the classroom. Pre-service teachers must prepare teaching and learning materials in line with the learning outcomes. By doing so, they can design different sets of activities based on the students' abilities [2]. Teaching has been reported as one of the high stress occupations in Malaysia [3]. Teacher education programs in Malaysia are responsible to redesign and rethink curriculum to make teaching more flexible and fun as pre-service teachers' initial years at the schools are deemed important and critical. One of the ways proposed is to focus on the teaching practice when these pre-service teachers are asked to undertake the practicum during their teaching development program [4]. Teaching practice has been viewed as one of the major courses in most of the TESL teacher education programs in Malaysia but little focus is given in terms of the orientation, content and practice. As a result, not much has been revealed on the experiences the pre-service teachers faced during their teaching practice in schools. Not only that, teaching

practice can be very stressful for the majority of the pre-service teachers as this is their first exposure into the teaching world [5]. Teaching practice is a platform for the pre-service teachers to interact with the students to showcase and apply their knowledge obtained from the teacher education program in order for them to develop strategies for differentiated instruction [6]. Previous research has been carried out to examine pre-service teachers' tensions and stress during their teaching practice [7], pre-service teachers' preparation into the teaching context [8]; [9]; [10], problems and challenges faced during teaching practice [4] and [11] and reflective thinking during the teaching practice [12]. Little is known about how the pre-service teachers optimize and implement technological, pedagogical content knowledge during the teaching practice. Therefore, there is a need to explore how pre-service teachers implement technological, pedagogical content knowledge during the teaching practice to optimize their teaching. Observing the pre-service teachers' TPACK implementation during teaching practice can also inform and educate the future novice pre-service teachers to prepare themselves with the strategies needed before they step into the school and teaching environment. Shulman [13] developed and created the Pedagogical Content Knowledge (PCK) which is the basic requirement for the teachers to be able to provide students with some effective teaching. The revised model (TPACK) is also very pertinent to capture students' interest in this new era in achieving 21st century learning. The objective was to obtain information regarding the pre-service teachers' implementation of TPACK through their teaching procedures that would enable the researcher to analyse the level of TPACK in teaching English Language.

2. Literature Review

The concept of pedagogical content knowledge (PCK) was initiated by Shulman in [13]. Shulman [13] incorporated two types of knowledge which are pedagogical knowledge and content knowledge for teachers. These two concepts, pedagogical knowledge and content knowledge, are important for the teachers to use and implement in the classroom. On the other hand, the concept of Technological Pedagogical Content Knowledge (TPACK) was introduced by [14]. They expounded the three knowledge area, (technology, pedagogy and content) should be inculcated into the teacher's professional knowledge to develop TPACK that is necessary to provide proper learning environment to digitally savvy students. According to [15], practicum is known as one of the most crucial aspects of teacher education.

Today, teacher education institutes throughout the world including Malaysia are facing problems in preparing the pre-service teachers for the real world of teaching. It is during the practicum that the pre-service teachers are given a chance to experience and experiment with their knowledge and skills (including TPACK) in an authentic teaching and learning environment. Pre-service teachers sent for teaching practice must be able to demonstrate and put into practice all the learning theories they have learnt in the universities. The school, which functions as the real world would then provide these teachers with a platform for showcasing their skills, knowledge and expertise during teaching practice.

The expertise here refers to the technological, pedagogical, content knowledge (TPACK) of the pre-service teachers which they must transfer into teaching to make learning more meaningful. According to [16], a novice teacher needs at least five years to develop sufficient expertise for effective teaching and this also applies for TPACK development. At the initial stage of teaching experience, a pre-service teacher must be well-versed with three areas of knowledge namely technological knowledge, pedagogical knowledge and technological content knowledge. It is very crucial for pre-service teachers to master these three areas of knowledge to enable them to become good teachers. Pre-service teachers were unable to apply the theories and knowledge gained during their practicum due to the stress they faced [4] and as a consequence, the pre-service teachers were unable to employ the pedagogical strategies for meaningful learning in the students.

Other prevalent issues reported were pre-service teachers' inability to implement and engage in good pedagogical and content knowledge, relief classes for teachers with outstation duties, communicating with the senior teachers, and interacting with the school community as a whole. According to [17], pre-service teachers were overwhelmed by the real classroom realities as they have to handle students who refused to cooperate during the student-centered classroom activities. This is further supported by [18], whereby pre-service teachers faced many challenges including teaching students with mixed abilities and designing materials for lower, intermediate and upper levels. [4] proposed the need to develop a better curriculum for teaching that will expose the pre-service teachers on interpersonal and communication skills and pedagogies that focus on student- centered learning. [18] suggested to review the government's policy to practice bottom up and top down procedures in universities in Malaysia, primary and secondary schools. This will encourage and promote positive collaboration and cooperation to improve the quality of the trained teachers.

Similarly, another study conducted by [19] revealed the problems encountered by music teacher trainees as they were unable to design strategies to musical creativity in the classroom for their learners. Music trainee teachers faced more problems when they were unable to prepare creative musical tasks in line with the higher order thinking skills. The music trainee teachers divulged that their problem

became worst when they were unable to incorporate some of the technological tools suitable for music activities. They shared that the reason behind their inability to assimilate the technological tools in line with music activities was due to lack of pedagogical strategies to incorporate the technological tools. The researchers concluded that it is crucial to propose training in emerging technological and pedagogical content knowledge methods to boost the development of twenty-first century skills among music trainee-teachers [20] opined the importance of merging theory and practice concurrently.

Discussions from the reviews showed that a gap exists between theory and practice apart from their integration. This is further supported by [21] in which the theory-practice gap is still prevalent and problematic; that is, teachers are still unsure of applying the theories in teaching, or that practices might be theories for some teachers. Furthermore, some studies focus on the importance of teaching quality for the pre-service teachers [22], [23], [24].

Some studies suggest that classroom climate will be an advantage for learners in the learning process [25], [26], [27], [28]. A conducive classroom climate will stimulate learners' motivation [22]. These learners will have more prospects in terms of being active and participate more during classroom interaction. Providing opportunities for active student participation in the classroom depends on the teachers' classroom management ability. A teacher with good classroom management can create an effective classroom climate directed at better instruction [30]. Pre-service teachers are expected to teach well and also ensure each teaching element is prearranged [32]. The theoretical basis for this research is provided by the TPACK model by [14]. The TPACK model emphasizes technological knowledge (TK), in line with pedagogical knowledge (PK) and content knowledge (CK), as an alternative to basic practice of teachers' professional knowledge [31]. Despite the problems identified in defining TK [14], TK largely discusses the knowledge of assimilating numerous technologies [29]. PK, on the other hand, can be interpreted as "teachers' deep knowledge about the processes and practices or methods of teaching and learning" [14], and CK refers to knowledge about specific subject matter. The study is guided by one research question:

How does the mastery of TPACK help the pre-service English teachers with their practicum?

The purpose of this study is to investigate how the mastery of TPACK assists the pre-service English teachers with their teaching practice.

3. Methodology

A case study design was selected to capture the pre-service teachers' integration of TPACK during their teaching practice. [33] claimed that recruiting fewer than four or five participants in a case study provides "ample opportunity to identify themes of the cases as well as conduct cross-case theme analysis" [33]. The case study is descriptive in nature and the focus is on the natural setting which is the classroom. This study will determine how the mastery of TPACK could help the pre-service English teachers to cope with their problems during teaching practice. A purposive sample of four Malaysian pre-service TESL teachers aged between twenty-two to twenty-three years old participated in this qualitative study. Each teacher was observed five times over twenty lessons.

Observation is one of the important and key tools for data collection in qualitative research [33]. Non-participant observation was conducted during the teaching sessions. A checklist was used during the observation to ensure uniformity in the elements observed during each lesson. After obtaining the pre-service teachers' written consent to take part in this study, five observations were made on each teacher over a period of twenty lessons. An observation checklist was used to ensure uniformity in the elements observed during each lesson. Each teacher was given a worksheet to be completed to indicate teaching strategies used and the post-lesson reflection. Thematic analysis was used to analyze the data inductively; analysis focused on identifying patterned meaning across a dataset. The following steps were carried out: (a) reading through all data to gain general understanding, (b) reading to identify codes (open coding), (c) comparing codes to construct themes (axial coding) [33].

4. Findings & Discussion

4.1. Technological Knowledge

The pre-service teachers are aware of the technological knowledge they have to embed in their teaching. They shared that they were informed by the mentor teachers in the school to integrate technology into teaching to garner students' attention. The pre-service teachers integrated technology such as speaker, mobile phone, LCD projector and laptop into their teaching. They also conveyed the lesson with smooth flow and managed to get all the students to engage with the lesson. A conducive classroom climate also contributed to the students' learning. From the classroom observation, all the four pre-service teachers were given very spacious classrooms and this can be considered as an advantage. The pre-service teachers started the lesson by asking the students to watch a video. Students were instructed to watch a funny video which was a short commercial advertisement on drinking water. The video was closely related to the topic that the teachers were about to teach on that day. Teachers selected the theme on 'Water' for the particular lesson. It could be considered as a brilliant way to start the class as the teachers were able to trigger students' interest towards the lesson. By watching the video, teachers were able to capture students' attention

from the very beginning of the lesson. Later, teachers played an audio on 'saving water'. From there, the students were asked to answer questions from the textbook. Teachers rewarded the students with some chocolates as they answered the questions given. It was a good approach to motivate students to participate in the teaching and learning process. Next, teachers flashed a PowerPoint presentation on brochure. The content of the slides explained what constituted a brochure. As the lesson progressed, pre-service teachers asked questions frequently to ensure students were aware of the topic that was being taught. The students were also divided into groups to complete the given task. The students were asked to share their thoughts which were the output from the discussion in their group with the rest of the classmates. From the observations made, pre-service teachers have good mastery of the technological knowledge. Pre-service teachers were able to use and integrate technology into teaching so as to make the lesson more interesting and comprehensible for their students. The findings also revealed that the pre-service teachers have sufficient knowledge in all the four domains in TPACK. The findings of this study are in line with the findings of [34]. The findings are, ICT skill test results showed a significant increase in students' scores. There is a significant increase for 'ICT as a tool for instruction and productivity' and 'enjoyment'. The results show that technological tools help the teachers to provide a better teaching and learning process. Similarly, the findings of this study match with the findings from [35]. The [35] study findings are: participants regard content knowledge and pedagogical knowledge as more important than technology-related knowledge; pre-service teachers applied technology in preparing and presenting the lesson but do not include in detail how the students were engaged with the ICT during the teaching and learning. Result of the interview reveal that the pre-service teachers do not bring ICT into the classroom due to some constraints such as school culture that disallows cell phone use in classrooms and also the exorbitant cost of data bundle used. In summary, the data collected suggested that the pre-service teachers were not skilled in the technology-related knowledge domain.

4.2. Pedagogical Knowledge

All the four pre-service teachers observed revealed a similar pedagogical knowledge to their subject matter knowledge. All the four pre-service teachers started their lesson by preparing interesting set induction that would trigger students' interest in the topic being taught. One example is on having a 'hangman game' with the students. From the observations made, the students were obviously triggered by the activity. The pre-service teachers observed delivered the content of the subject taught through sharing the general overview of the topic. They used colorful picture cards to deliver the content. The teachers even distributed crossword puzzles to assess the students' understanding of the topic taught. The pre-service teachers discussed the answers with the students together to ensure comprehension of the topic.

The pre-service teachers asked questions frequently to assess the students' understanding so as to get them engaged with the lesson. The students were instructed to get into groups of five and they were given a task to be solved as group work. Each and every group had to present the product of their discussion in front of the classroom. After each group's presentation, the pre-service teachers gave a few comments and also allowed the other groups to share their thoughts and opinions. There was two-way communication and even though the teacher did more talking, the students responded accordingly. After that, the teachers recapped the lesson by revising the topic learnt on that day. From the flow of the lessons and the classroom observations, it was clear that the pre-service teachers used good pedagogy of teaching and also have clear vision of the content being taught.

Furthermore, pre-service teachers allowed and motivated their students to debate on issues by giving them tasks related to real-life examples. The tasks given required the students to interpret and give feedback to real-life situations. The teachers did this by asking questions that require higher order thinking skills. The findings of this study support the findings by [36]. They carried out a study to look at the pre-service teachers' use of ICT during teaching practice and how they relate it to the Technological, Pedagogical and Content Knowledge (TPACK) mastery before and after completing the field experience in New Zealand and in Malaysia. The mean of all quantitative score for the entire TPACK domain indicated overall positive response. Technology knowledge reported the lowest mean score among the seven areas of observations of TPACK. The findings revealed that pre-service teachers agreed that they were well-versed with technology knowledge, adequate for them to implement technological knowledge during their teaching practice. In summary, the findings suggested that all the three domains of knowledge were equally important.

4.3. Content Knowledge

The pre-service teachers observed in this study have a good mastery of content knowledge. They were well-prepared and could answer most of the questions asked by the students during the teaching and learning process. The pre-service teachers delivered the content knowledge by teaching a certain topic; for example teaching about pollution, teachers should know basic knowledge about pollution. From the observations made, pre-service teachers were able to relate the topic taught with the students' prior knowledge. The pre-service teachers tried to elicit understanding on 'pollution' from the students. Then, the information gathered from the

students were then added with some examples from the newspaper to reinforce students' understanding on the topic taught and discussed. All the four pre-service teachers have a very concrete content knowledge and they were all very well-versed with the content of all the topics they have taught. All the four pre-service teachers knew the definition of content knowledge. The findings of this study are in line with the findings by [36]. The researcher explored a web-based teaching activity designed for technological pedagogical content knowledge (TPACK) development in pre-service history teacher education in Turkey. This research was conducted using problem-based learning (PBL) approach. The participants were 27 student teachers (14 females and 13 males) who received both disciplinary education in history and pedagogical formation. The results show that effective TPACK development in pre-service teacher education requires systematic engagement of student-teachers in rich teaching experiences within the real teaching contexts.

5. Implications and Conclusions

This study has a number of implications that need to be underscored. First, mastery of pre-service teachers in terms of the technological pedagogical content knowledge for teaching English Language is important for enhancing their confidence pertaining to pedagogical knowledge (what they know about teaching) and their subject matter knowledge (what they know about what they teach). Pre-service teachers can always explore and share their theoretical knowledge with their assigned mentor teachers in the schools. They can always invent new ideas where teaching and learning are concerned to create invigorating experiences during the teaching practice. The findings revealed that the pre-service teachers had knowledge about their content area and pedagogy at a lower level. The pre-service teachers' technological knowledge was limited to PowerPoint presentation and also YouTube. They have to equip themselves with the current development in technology tools to enhance their understanding and knowledge. It is suggested that the pre-service teachers should take up more courses on technology so that they can explore a variety of technological tools for teaching. Although the content knowledge was not so apparent in the findings, the pre-service teachers make sense of the content knowledge through the pedagogical knowledge in their teaching practice simultaneously. This study has its limitations; it was undertaken on a very small scale. The results of the study show the possibility of enhancing pre-service teachers' TPACK through feedback from classroom observations.

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