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Technology Integration Analysis Among TVET Lecturers in Sarawak

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Abstract: High-quality TVET graduates have become one of the top priorities in many countries because they directly impact a country's economic development. As a result, TVET lecturers should be equipped with sufficient pedagogical and content knowledge in the skills taught. Nonetheless, the COVID-19 pandemic situation impacted the pattern of TVET education, urging the use of technology in a more holistic approach. This study evaluated the current level of competencies of TVET lecturers in integrating technology in their teaching and learning sessions via Technological Pedagogical Content Knowledge (TPACK) model. This study used a quantitative research methodology through a survey approach on TVET lecturers. A questionnaire was distributed to all TVET lecturers from six Community Colleges in Sarawak (N=68, n=62). The analysis of quantitative study findings showed that TVET lecturers assumed their technological, pedagogical, and content knowledge (M=5.71, SD=.691). The mean score of technological knowledge (TK) was the most dominant knowledge component (M=5.91, SD=.726). The mean score of TPACK knowledge was the lowest knowledge component mastered (M=5.46, SD=1.046). The main findings were discussed from the demographics studied, namely gender, teaching experience, academic level, and field of specialisation, to better understand the level of knowledge of current TVET lecturers. The findings of the current study could help policymakers to design professional development programmes that consider the interaction of pedagogical, content, and technological knowledge to improve TVET teaching and learning, in line with the Ministry of Higher Education's emphasis on the TVET sector as a catalyst for national development.

Keywords: TPACK, TVET, community college, technology, COVID-19

1. Introduction

According to the Malaysian Economic Report 2017/2018, Malaysia was reported as having a skilled labour shortage. Malaysia reported a 25.5% skilled labour lower than developed countries such as Singapore (56.2%), Australia (45.2%), and the United States when compared to other developed countries (42.2%). Furthermore, Malaysia was placed 46th out of 137 nations in terms of industrial productivity, indicating the lack of efficiency in technology utilisation among Malaysians (MOF, 2017). When Malaysia suffers from workforce disparity, the country's production also suffers (MOF, 2017). The execution of development and improvement in the education system, particularly in boosting the professionalism of TVET lecturers, plays a critical role in accomplishing the government's goal of making Malaysia a competitive country (Wahab & Saud, 2021). This is because Technical and Vocational Education and Training (TVET) in the national education system aids countries' economic development agendas. Accordingly, cultivating skilled human capital in TVET catalyses a country's economic advancement, positioning countries, including Malaysia, as some of the most productive developed nations. The Malaysian government has implemented several initiatives, including conducting professional development programmes for TVET instructors, especially in the context of the Fourth Industrial Revolution (4IR), in line with the government's commitment to globalising TVET in the country (MOE, 2018). This is in accordance with the belief that competent TVET instructors should be able to address the problem of employability skills and non-marketability among graduates and the problem of mismatch in the workforce (Hanapi & Nordin, 2014). It is also hoped to modify the attitude of most Malaysian companies, who believe that most TVET graduates do not meet quality standards, particularly regarding technical capabilities in the workplace (MOE, 2018).

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TVET education is a skills-based industry education focusing on employability skills. TVET is defined as all aspects of the educational process involving general education, technology, and related scientific research, as well as the acquisition of practical skills, attitudes, understanding, and knowledge related to employment by the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) (MOE, 2018). TVET education attempts to ensure that the essential workforce requirements in a given field fulfil standards, focusing on practical components, psychomotor skills, and exposure to industrial training. Based on this, TVET lecturers should ensure that TVET students can master the knowledge presented as expected, including the mastery of abilities in various economic and social domains, such as the application of particular technologies. Therefore, TVET education should be led by skilled and quality TVET lecturers in terms of content knowledge, pedagogical knowledge, and knowledge in the use of the latest technology to be ready to support the aspirations of TVET.

Nowadays, the use of technology in teaching and learning has become a demand in education that must be met. Technology has a significant impact on education, how students learn, and how teachers and students interact (Cox & Prestridge, 2020; Hwang & Tsai, 2011). TVET lecturers are generally aware and acknowledge that they need to keep abreast with technological developments in the teaching and learning (Mahat et al., 2019; Okundaye, 2017; Koehler et al., 2013). For example, technology has also benefited education through various distance education programmes and the Internet, which instructors and students may use (Pooja, 2021; Stošić, 2015). However, the rapid development of technology results in TVET lecturers facing challenges. TVET lecturers struggle to integrate technology into their teaching and learning, and some lecturers still practice conventional teaching and learning in the national education situation that is actively expanding technological education (Mahat et al., 2019). The rapid progress of technology in education also requires TVET lecturers to improve their teaching quality through technical capabilities, namely, to handle presentation tools, digital publications, document management, online communication, and drawing tools demand TVET lecturers (Pooja, 2021). In addition, the lack of provision of technological tools in educational institutions by the authorities is also among the constraints that need to be faced by some educational institutions (Santos & Castro, 2021). As most industry developments are now recommended to support the Industrial Revolution 4.0 (4IR), TVET lecturers and educational institutions should also be on the same track to support these developments to ensure the TVET graduates produced are of quality in line with industry requirements.

Previous research (i.e., Hanapi et al., 2017; 2015; Stošić, 2015; Hanapi & Nordin, 2014) has revealed that teaching effectiveness is essential in producing quality graduates. However, the COVID-19 pandemic has posed a significant issue for TVET lecturers as the pandemic puts TVET education to the test and transformed the pattern of TVET learning outcomes as a whole, with a greater emphasis on mastery of practical skills. As a result of this predicament, TVET lecturers' teaching and learning habits have shifted as a whole. Because TVET education emphasises practical training, adapting technology to guarantee students understand practical learning outcomes is becoming increasingly difficult. Accordingly, TVET lecturers must understand how to use technology effectively and develop effective teaching practices in this context. Also, TVET lecturers need to update their skills in line with the needs of the current industry while not ignoring the importance of pedagogical mechanisms. TVET lecturers must wisely create teaching strategies using technology based on the ministry's actions, consider the knowledge of the use of technology in the 4IR industry and adapt it to the current condition. Meanwhile, TVET institutions have adapted the implementation methods of technology education and training by providing courses based on demand, significantly reducing capacity differences in terms of efficiency with the 4IR industry (MOE, 2018).

In short, TVET lecturers require teaching abilities, specifically material knowledge, to teach content (Herold, 2019; Shulman, 1986). Content knowledge and pedagogy should not be the only elements learned in today's educational environment. Teaching TVET requires a high technological understanding and the use of technology to aid in the teaching process. During the COVID-19 outbreak, its relevance may be seen in person and virtually. In addition, teaching practises that stress 21st-century pedagogical delivery include deep learning and student-centred learning. Koehler and Mishra (2009) emphasised the importance of technological knowledge by developing a TPACK (Technological Pedagogical and Content Knowledge) model framework. Based on the framework of this model, Koehler and Mishra (2009) proposed to add technological knowledge to the knowledge base of lecturers by Shulman (1986). According to Koehler and Mishra (2009), lecturers should have essential basic knowledge, including three main parts: content knowledge, teaching knowledge, and technical knowledge. The TPACK framework emphasises how understanding the interaction between teaching content, teaching practices, and the technology used in the teaching process produces a meaningful learning experience (Ebil et al., 2020; Alenezi, 2018; Koh & Chai, 2014). Since TVET teaching and learning emphasises the use of technology, the TPACK theoretical framework is used to examine the level of existing knowledge of TVET lecturers.

TPACK's research has given meaning to the technological teaching and learning (Koh et al., 2014; Koh & Chai, 2014; Yeh et al., 2014). Many past studies have proven how this model can visually explain the complex relationship between technological knowledge, pedagogy, and content. The model primarily identifies the level of knowledge of TVET lecturers in implementing the TVET curriculum (Mutanga et al., 2018; Brien, 2015; Chua & Jamil, 2014; Chua & Jamil, 2012). The mastery of the knowledge level of TVET lecturers is often questioned following feedback from employers stating that TVET graduates are still inept in knowledge, skills, and attitudes (MOE, 2015). Although the total marketability percentage of some institutions exceeds 90 per cent (MOHE, 2018), most of the industry believes that TVET graduates are still unable to contribute to increased productivity based on work quality (MOE, 2018). Therefore, the level of knowledge of TVET lecturers is often questioned due to the occurrence of incompetence in TVET graduates in various aspects of employment and knowledge. Thus, in particular, TPACK research in TVET education is fundamental to providing more precise feedback on questions faced on the incompetency of TVET graduates, as informed by employers in Malaysia. In addition, the degree of expertise of TVET lecturers has not yet reached an appropriate level, according to several previous studies employing TPACK. For example, Chua and Jamil (2014; 2012) indicated that TVET lecturers in public institutions still have moderate TPACK, while Brien (2015) found that TVET teachers have a moderate level of TPACK, with all levels of technology component knowledge lower than expected. Furthermore, Mutanga et al. (2018) discovered that most engineering lecturers (55 %) were still confused about employing technology in their teaching and learning, concurring with earlier research on TVET lecturers' lack of technological knowledge.

Past studies examining the relationship of demographic factors with TPACK mastery among lecturers show mixed findings (Akun, 2019; Antonelli, 2019; Chua & Jamil, 2012; Koh et al., 2010). Among the demographic factors that are often studied are gender factors and duration of teaching experience that affect the level of mastery of TPACK. However, factors such as field of specialisation and level of academic achievement are also considered essential to generate knowledge in more focused TVET teaching and learning. Thus, in this study, the field of specialisation is believed to impact the study differently when it involves a broader range of field clusters. Gender studies through quantitative studies by Chua and Jamil (2012) and Antonelli (2019) found no significant difference between gender and level of knowledge, indicating contrasting findings from Koh et al. (2010). Even so, Koh et al. (2010) found significant differences between genders on the level of knowledge of pre-service teachers in Singapore. According to Voithofer et al. (2019), the number of years teachers taught fundamental subjects (English, Mathematics, and Science) did not affect TPACK mastery However, contrary to a study of kindergarten and primary school teachers (Technology subject teachers), their TPACK competence level was statistically demonstrated to be associated with their total years of teaching ($t (151) = 2.16$, $p = 0.032$). Jang and Chang (2016) showed that people with a PhD degree assessed their topic material knowledge significantly higher than those without a doctoral degree in a study on the level of academic credentials. While Voithofer et al. (2019) and Chua and Jamil (2014) looked at the relationship between specialisation and knowledge level, they discovered that the field of specialisation has a positive relationship with knowledge level.

Given that the field of TVET has become a catalyst for developing a technological nation, the context of technological knowledge in the teaching and learning of TVET should be examined. The inconsistencies in the findings of studies that have been conducted underscore the need to study demographic factors such as gender, duration of teaching experience, academic level, and field of specialisation needed in TVET education. Thus, the current study examined the level of knowledge of TVET lecturers to integrate technology in the teaching and learning of TVET by measuring the current level of knowledge of TVET lecturers using the TPACK model and analysing the variations in content knowledge, pedagogy, and technology (TPACK) based on demographic factors among TVET lecturers.

2. Methodology

This study employed a quantitative research methodology. A survey questionnaire was used as the primary tool to determine the degree of topic knowledge, pedagogy, and technology among TVET lecturers and examine the disparities in the level of knowledge and demographic characteristics. A total of 62 people (27 men and 35 women) were involved, all of whom were currently working as lecturers at Sarawak Community College. The participants' academic qualifications ranged from diplomas to Master's degrees, with the time of instruction varying.

The questionnaire was adapted from previous studies by Schmidt (2020) and Sahin (2011). Section A consisted of 76 items, 17 items of content knowledge ($\alpha = .956$), 11 items of pedagogical knowledge ($\alpha = .944$), 7 items of pedagogical content knowledge ($\alpha = .949$), 21 items of technology knowledge ($\alpha = .960$), 6 items of technology content knowledge ($\alpha = .964$), 9 items of technology pedagogy knowledge ($\alpha = .968$), and 5 items of content knowledge, technology pedagogy ($\alpha = 961$). Section B consists of demographic information of the respondents, such as gender, age, academic qualification, duration of teaching experience, the field of specialisation, and the field taught. Respondents' responses were evaluated using a Likert scale of seven (7), where a scale of seven represents strongly agree while a scale of one (1) represents strongly disagree. The data was analysed using descriptive statistics such as frequency, mean, and standard deviation.

3. Results

3.1 Level of Pedagogy, Content, and Technology Knowledge of TVET Lecturers

Descriptive statistical analysis showed that the level of content knowledge, pedagogy, and technology of TVET lecturers ($n = 62$) was at a relatively high level ($M = 5.71$, $SD = .691$). The values for the mean scores of all TPACK knowledge components are as in Table 1.

Table 1: Mean score and standard deviation for TPACK component of TVET lecturers

TPACK components	Mean	Standard deviation
CK component	5.65	.633
PK component	5.78	.636
PCK component	5.70	.722
TK component	5.91	.726
TCK component	5.72	.860
TPK component	5.72	.801
TPACK component	5.46	1.046
TPACK overall	5.71	.691

Table 1 shows that the Technology Knowledge (TK) component had the highest mean score value (M = 5.91, SD = .726), while the lowest mean value was the TPACK Knowledge component (M = 5.46, SD = 1.046). As a result of the ongoing COVID-19 pandemic, expanded online teaching and learning may have influenced higher levels of confidence in using technology. These findings also indicate that TVET lecturers understood integrating the components of pedagogical knowledge, content, and technology and more having structured exposure. Although TVET lecturers showed confidence in using technology separately, understanding the content and teaching methods is important to determine the appropriateness of using technology. Therefore, a comprehensive understanding of these three components could produce more dynamic TVET lecturers with an increased level of TPACK (Koh et al., 2013).

3.2 Analysis of TPACK Component Levels on Demographic Factors of TVET Lecturers

3.2.1 Gender

Based on the frequency distribution of gender analysis, the number of female respondents was higher (56.5 %) than that of male respondents (43.5 %). Table 2 details the gender demographic mean score values showing the high TPACK level mean scores between males (M = 5.65, SD = .699) and females (M = 5.75, .691).

Table 2: Gender demographics, number, mean score, standard deviation, t-value, and significance level

Gender	N	Mean	Standard deviation	t-value	Significance Level
Male	27	5.65	.699	-.534	.982
Female	35	5.75	.691		
Amount	62	5.71	.690		

Based on Table 2, the mean score difference between male and female respondents was 5.65 - 5.75 = -0.10. A negative t-value indicates that the mean score of male respondents was lower than that of female respondents. However, the independent sample t-test analysis results showed no significant difference between the level of TPACK (t = .534; p > .05) between male and female respondents. Fig. 1 shows that the percentage rate of respondents for each component was almost the same between males and females. The finding further confirmed that statistically, the level of knowledge between men and women had no significant difference. However, the findings of the current study showed significant differences between genders on the Technology Content Knowledge (TCK) component. A total of 83 per cent of female respondents, compared to 59 per cent of male respondents, agreed they had a high level of knowledge of the TCK component. Male respondents showed they were slightly ahead in Content Knowledge (CK) compared to female respondents but were still weak in integrating the content taught using specific technologies (TCK) (Koehler & Mishra, 2009).

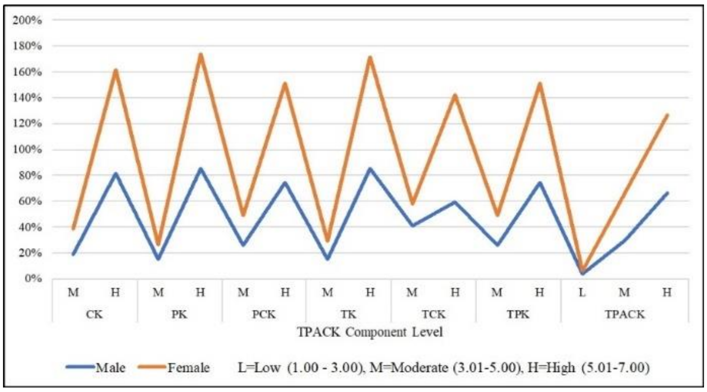

Fig. 1: Percentage of respondents by TPACK component and gender

In summary, no significant differences between male and female respondents were found in any knowledge components. Despite this, both genders indicated having less understanding of the TPACK component than others working in other areas. The percentage of responses to combined components like PCK, TCK, and TPK revealed that the high degree of knowledge had a smaller percentage of respondents than the single components like CK, PK, and TK. These findings suggest that they still hesitated to include technology in their teaching and learning while considering methodology and content.

3.2.2 Teaching Experience

According to Table 3, a total of 20 respondents (32.2 %) had 1 to 5 years of teaching experience and 6 to 10 years of teaching experience. A total of 18 respondents had 11 to 15 years of teaching experience (29.0 %). Only four responders (6.4 %) had 16 years or more of teaching experience. Table 3 depicts the distribution of mean knowledge level scores across the five levels of teaching experience. The one-way ANOVA statistical test revealed that there was no significant difference (F (4, 57)) between the overall level of knowledge and the five levels of teaching experience duration (P =.849).

Table 3: Demographic information: teaching experience, number, mean score, standard deviation, t-value, and significance level

Teaching experience	N	Mean	Standard deviation	T-value	Significance level
1-5 years	20	5.7869	.72666	.341	.849
6-10 years	20	5,6796	.59390		
11-15 years	18	5.7419	.82142		
16-20 years	3	5.3020	.32721		
26 years and older	1	5.5509	.		
Total	62	5.7119	.69067		

Despite this, most respondents agreed that they had a high degree of understanding of all knowledge components during their time as lecturers, as seen in Fig. 2. The finding demonstrates that their strong confidence in content understanding, pedagogy, and technology was unaffected by their brief teaching experience. Compared to more experienced respondents, a higher percentage of respondents with 1 to 5 years of experience claim to have strong knowledge of the Pedagogical Knowledge (PK) component. The finding demonstrates that, even though the teaching duration of TVET lecturers was short, they were more confident in adopting technology in their teaching and learning.

Finally, the length of teaching experience had little bearing on the degree of knowledge of TVET professors regarding teaching and learning. During their whole teaching experience, only 36 per cent of lecturers regarded themselves as having a high knowledge of the TPACK component. This modest percentage indicated that most TVET lecturers still misunderstand how the components of pedagogical expertise, content, and technology interact.

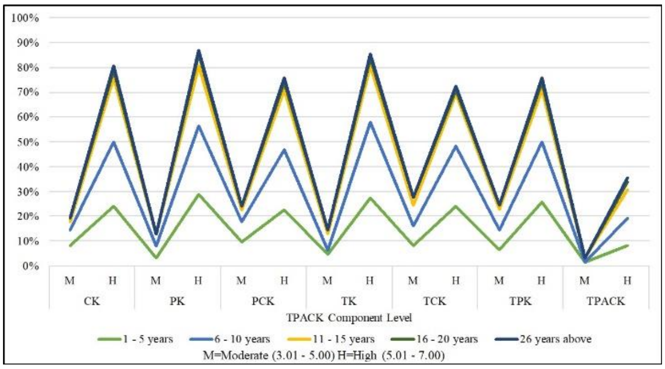

Fig. 2: Percentage of respondents by TPACK component and teaching experience

3.2.3 Academic Qualification Level

As stated in Table 4, 33 respondents (53.2%) have a bachelor's degree. While 23 people (37.1%) have a Master's degree, six have a Diploma (9.7 per cent). According to one-way ANOVA statistical tests, the total level of knowledge (F (2, 59) = 1.027, P =.364) with the three groups of different academic levels was not significantly different.

Table 4: The demographic information

Academic level	N	Mean	Standard deviation	T-value	Significance level
Diploma	6	5.3375	.65842	1.027	.364
Bachelor	33	5.7276	.66520		
Bachelor	23	5.7871	.73211		
Total	62	5.7119	.69067		

According to Fig. 3, the majority of those with a bachelor's degree evaluated themselves as having a high degree of understanding of each component of TPACK expertise. The high percentage of each knowledge component influenced the outcomes of this research because the majority of the respondents in this survey have a bachelor's degree. However, a considerable proportion of diploma-holder respondents (9.7%) said they were more confident in possessing a high level of expertise in each knowledge component. Respondents with a Master's degree were reported to be less confident in their knowledge, as evidenced by the lower proportion of knowledge in Fig. 3.

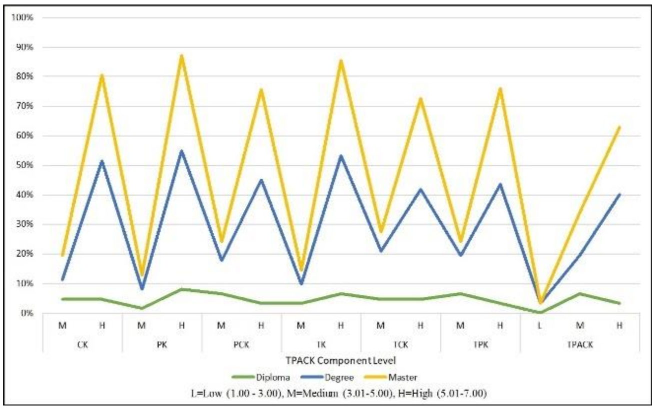

Fig. 3: Percentage of respondents by TPACK component and academic level

The data analysis revealed that the academic qualification of TVET lecturers had no bearing on their knowledge. The data also reveal that professors with lower academic degrees have more faith in their teaching and learning abilities. As a result, persons with greater academic degrees do not necessarily feel more confident in their pedagogical, content, and technological skills in TVET teaching and learning, according to the findings of this study.

3.2.4 Field of Specialisation

The data obtained was based on the field of specialisation of the respondents. Based on Table 5, the distribution of respondents' data consisted of 13 different areas of specialisation. The distribution shows that the Tourism and Travel field had the highest number of respondents (12.9 %) compared to other fields of specialisation. Accordingly, three areas of specialisation of the respondents' highest approval were not related to the field taught, such as Education, TVET, and Management. Nevertheless, the area of specialisation of the respondent was an area related to the field being taught. One-way ANOVA statistical test shows that the mean score of the knowledge level of TVET lecturers with different areas of specialisation studied had no significant difference ($F (12, 49) = 1.183$, $P = .322$).

Fig. 4 specifies that the study's findings are divided into two categories: technological and non-technological. The results indicated that the mean score value of the highest level of knowledge consisted of 3 fields of technology, namely the field of computer systems and networks ($M = 6.26$, $SD = 1.00$), interior design ($M = 5.92$, $SD = .000$), and information technology ($M = 5.85$, $SD = .169$). The three highest areas of specialisation listed belong to the computer cluster, where teaching and learning are based on the use of computers. Based on the mean scores for the level of each component studied, the technology knowledge (TK) component ($M = 5.91$, $SD = .726$) showed the highest mean score for all respondents. The high mean score value in the TK component led to the overall TPACK level mean score value in this cluster (Nelson et al., 2018). These findings also revealed that lecturers for this field of specialisation had high confidence in the use of computer adaptation in TVET teaching and learning.

Table 5: Demographics areas of specialisation, number, mean score, standard deviation, t-value, and significance level

Field of specialisation	Number	Mean	Standard deviation	T-value	Significance level
Fashion and apparel	7	6.0563	.50783	1.183	.322
Architectural technology	5	5.3567	.34600		
Tourism &a	8	5.7402	.55797		
Information technology	3	5.8591	.16957		
Landscape	5	5.7232	.46732		
Electric technology	7	5.8560	.78551		
Industrial maintenance	3	5.2550	.36431		
Interior design	1	5.9240	.		
Computer systems & networks	6	6.2658	1.00647		
Culinary	6	5.4625	.78953		
Education	2	5.8145	.04734		
TVET	6	5.1433	.73941		
Management	3	5.7698	1.12742		
Total	62	5.7119	.69067		

Fig. 4 further demonstrates that among all areas of specialisation analysed, the TVET field of speciality had the lowest mean score (M = 5.14, SD =.739). TVET field of speciality was one of the most popular among respondents but was not provided at community colleges. The respondents' Content Knowledge (CK) in this field was considerably distinct from the field taught. The significance of Information Knowledge (IK) in the subject of expertise taught should be stressed to confirm the confident and accurate communication of educational content by TVET lecturers. These findings imply that one's level of academic qualification is less essential than one's level of Content Knowledge (CK) in the subject of expertise taught. The academic level of TVET lecturers was also taken into account.

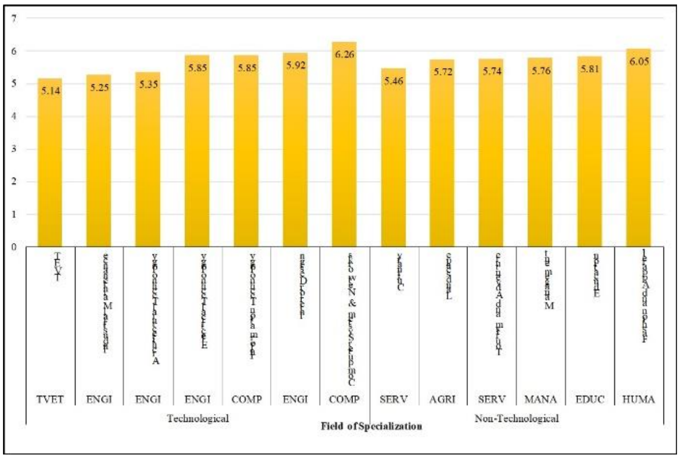

Fig. 4: TPACK mean score by field of specialisation

Additionally, the fashion and apparel field from the non-technological field category shows the highest TPACK mean score values (M = 6.05, SD = .507) compared to other non-technological fields. The fashion and apparel field is under the humanities cluster, where it is categorised as a field that uses less computer technology and the internet. The learning outcome of this field was the production of products in the form of clothing and accessories. Through practical training, teaching this field extensively uses technology equipment such as sewing machines and other sewing hardware. For example, applying high-level knowledge of sewing machines and hardware has indirectly contributed to the high-level mastery of TPACK in their teaching and learning. Although this field is not based on computer and internet skills, the high Technological Knowledge (TK) of sewing machines and equipment makes students confident in using technology for practical training purposes in the classroom. At the same time, these findings also show that Technological Knowledge (TK), whether in the form of technology or non-technology, is critical in TVET teaching to integrate the content taught with appropriate teaching methods to optimise pedagogical approach.

In conclusion, the findings suggest that the level of expertise of TVET lecturers is unrelated to the field of specialisation taught. Other demographic criteria investigated, such as gender, length of teaching experience, and academic degrees, had no bearing on the lecturers' level of TVET knowledge. Between the categories of technological areas and non-technological fields, there is a difference in the mean score of knowledge level. The technological field had the highest mean score value when compared to the non-technical field. However, Technological Knowledge (TK) showed its significance since the mean score value for this component results in a high TPACK mean score value for both fields.

4. Discussion

This study examined the level of Technology, Pedagogy, and Content (TPACK) knowledge of TVET lecturers in their teaching and learning. Two main objectives were outlined in this study to assess the current level of knowledge of TVET lecturers using the TPACK model framework to analyse the differences in the knowledge level of the lecturers according to the demographic factors of TVET lecturers. The results showed that the level of technological knowledge, pedagogy, and content of TVET lecturers was high in the entire knowledge component. The knowledge level of TVET lecturers was found to have no difference with the factors of gender, teaching experience, academic level, and field of specialisation studied (Ebil et al., 2020; Shafie et al., 2019).

Most TVET lecturers who participated in this study expressed confidence in Technological Knowledge (TK) and applied it as a skill that can be passed on to students. A lower mean Pedagogical Knowledge (PK) score relative to Technological Knowledge (TK) impacts overall mastery of the TPACK level. Some TVET professors believed that pedagogical knowledge (PK) was a less relevant aspect of TVET teaching and learning because TVET education emphasises practical activities and specific machines (Chua & Jamil, 2014). As a result, TVET lecturers are deemed to have the potential to improve their instructional knowledge. Even if they demonstrate mastery of knowledge independently, the absence of fluid understanding between subject, pedagogy, and technology proved their pedagogical incompetence.

Most TVET lecturers in the study agreed they have adequate technical skills (CK) in their field. The results also showed that they had mastered the skills required in the guided curriculum. Although the guided curriculum is set at a basic level, the challenge of expanding technical skills in line with industry requirements may be a constraint that must be faced. Facing the Industrial Revolution 4.0, mastering the latest technical skills should be the role of TVET lecturers, requiring them to be more competent in this context (Spöttl & Windelband, 2021). In line with the needs of the national education system that emphasises the mastery of occupational skills, the technical skills component or content knowledge in the field of TVET will have a more convincing impact on teaching. While the curriculum may not be fully up-to-date with technology, TVET lecturers should take initial steps to be more competitive with the current industry. As such, the TVET curriculum that drives the expansion of this 4.0 industry will help TVET lecturers towards more meaningful teaching and learning.

5. Conclusion

In conclusion, this study provides an overview of the country’s community college TVET professors’ skills and preparation. While some firms claim that TVET graduates lack the abilities necessary for the industry, they have a high degree of knowledge on average. The status of TVET lecturers’ knowledge levels in the twenty-first century can considerably impact TVET teaching and learning in the industry. 4.0. The outcomes of this study also demonstrate that the increased usage of technology during the COVID-19 pandemic had boosted TVET instructors’ confidence in the technological learning environment. Furthermore, this study’s findings show that continual training in teaching professional development is beneficial.

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