The development of an online-based TPACK questionnaire for ELT teachers

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ABSTRACT

The concept of Technological Pedagogical Content Knowledge (TPACK) has gained significant attention in the field of education due to the widespread adoption of innovative technologies, particularly accelerated by the COVID-19 pandemic and the surge in online teaching. To effectively measure TPACK, the utilization of a well-designed and tailored questionnaire has emerged as a sophisticated approach. The aim of this research is to develop a questionnaire that is valid and reliable specifically for the context of online learning. In order to ensure the validity of the questionnaire, expert validation was conducted with three professionals from diverse backgrounds, including an Indonesian professor, a Ph.D. student, and a local education supervisor. By incorporating their recommendations, the questionnaire underwent revisions and refinements. Subsequently, the validity of the questionnaire was assessed by administering it to 43 participants across four Indonesian provinces: West Java, East Java, East Boneo, and West Nusa Tenggara. The findings indicated that the questionnaire demonstrated strong validity and reliability, making it a valuable tool for evaluating teachers' TPACK in online teaching environments. Statistical analysis using the SPSS 23.0 software confirmed the validity and reliability of all 24 questionnaire items, further endorsing its readiness for future research endeavors. Additionally, this questionnaire can be tailored to meet the unique requirements of teachers across different education programs, thereby enhancing its applicability and versatility. In conclusion, this study contributes to the field of online teaching by providing a robust instrument for assessing teachers' TPACK, facilitating targeted interventions and improvements in instructional practices.

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1. Introduction

The COVID-19 pandemic has resulted in a rapid and simultaneous transformation of the educational systems worldwide, emphasizing the need for technology in education. This can be observed through research and government regulations that highlight the digital sphere's role in reshaping education (Kang, 2021; Mahzan, 2021; Schleicher, 2020). Various topics such as assessment during the pandemic, the voices of students and teachers, teaching methods, and media have become readily accessible and important areas of study. This dynamism underscores the adaptable nature of education, which evolves based on real-world needs.

In line with this notion, technology is crucial in pandemic education. Maria et al. (2020) argue that teachers' competence, previously referred to as "pedagogical content knowledge," has evolved over the past 30 years. Specifically, the term "content" in this context signifies that teachers should possess advanced knowledge in their specific teaching fields. The "pedagogical" aspect pertains to their understanding of teaching methods, assessment, teaching tools, and student interactions. In 2006, Koehler and Mishra extended these competencies to include technology, resulting in the concept of Technological Pedagogical Content Knowledge (TPACK), which encompasses the three essential knowledge components for teachers in the digital era.

TPACK is a framework comprising three fundamental components: technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). It also includes four hybrid components: pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPCK). The incorporation of technology within this framework reflects its significant influence on education, impacting over 50% of teaching processes and activities (Fransson & Holmberg, 2012), particularly during the pandemic (Ammade et al., 2020; Maria et al., 2020). Qualitative analysis and questionnaires are commonly employed to study and assess TPACK in both qualitative and quantitative research approaches.

Questionnaires play a pivotal role in TPACK survey research, providing a means to gather abstract ideas, beliefs, concepts, and attitudes (Jr et al., 2014; Roopa, 2012) related to TPACK. They serve as suitable instruments for identifying teachers' professional needs (Mahony, 2015). Today, questionnaires have evolved beyond traditional printed formats and can be administered online, facilitating survey research in the digital age.

TPACK has become a popular topic of study in survey research and is widely searched on the internet. For instance, Akman and Güven (2015) developed a questionnaire to analyze TPACK and self-efficacy perceptions among social science

teachers and teacher candidates. Their questionnaire comprised 50 items, employing a five-point scale ranging from "I do not know" (1) to "I know in a very good level" (5), yielding a Cronbach's Alpha reliability coefficient of 0.977. Fuad et al. (2020) investigated Indonesian Language Teachers' TPACK for online learning by adapting the questionnaire developed by Schmid et al. (2020). Their questionnaire consisted of 30 items divided into TK, CK, PK, PCK, TCK, PCK, and TPCK groups. Participants indicated their responses on a five-point scale, ranging from "strongly agree" (SA) to "strongly disagree" (SD). However, no validity test was conducted for the questionnaire. Additionally, Maria et al. (2020) developed a TPACK questionnaire comprising 28 items and utilizing a five-point scale.

However, previous TPACK questionnaires have primarily focused on general teaching aspects, without explicitly addressing the specific teaching setting. Yet, the true value of a framework lies in its ability to explain and make sense of the real world (Imenda, 2014; Jabareen, 2009; Nilsen, 2015). Unfortunately, the process of developing questionnaires often varies in quality and lacks consistent, rigorous standards (Maria et al., 2020; Jr et al., 2014). Therefore, as educational supervisors, the researchers are motivated to provide comprehensive and valid tools to support education, particularly in the context of online pandemic education. Developing a TPACK questionnaire specifically designed for online teaching is crucial to minimize biased interpretations, considering the emergence of online learning as a new educational culture. In this study, the researchers aim to develop a concise TPACK questionnaire based on valid and reliable measurements, particularly in the English as a Foreign Language (EFL) context. Thus, the research question is focused on developing an online-teaching-based TPACK questionnaire for ELT teachers.

2. Literature review

The primary objective of this study is to develop a TPACK questionnaire specifically tailored for online teaching. To achieve this goal, the researchers will first provide a comprehensive review of the TPACK framework as the theoretical foundation for this study. This review will focus on discussing the key components of TPACK, namely Content Knowledge, Pedagogical Knowledge, Technological Knowledge, Technological Content Knowledge, and Technological Pedagogical Knowledge.

2.1. TPACK

The concept of Technological Pedagogical Content Knowledge (TPACK) revolves around the integration of knowledge required in teaching and technology, and how teachers can develop that knowledge within themselves. TPACK specifically refers to the knowledge teachers need to effectively incorporate technology into their curriculum and instructional practices. It encompasses the interplay between teachers' content knowledge, pedagogical knowledge, and technology knowledge, highlighting their interconnectedness (Knolton, 2014).
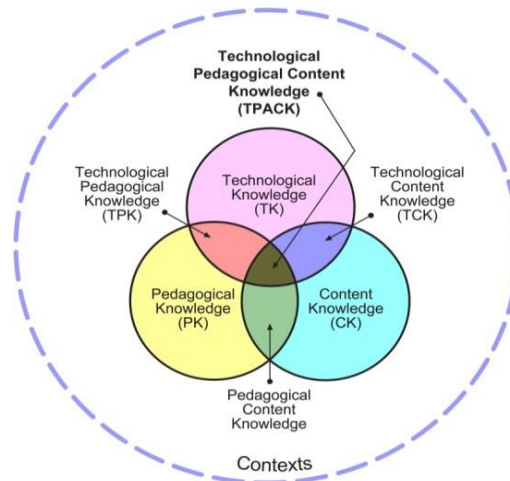
Figure 1. The technological pedagogical content knowledge framework

From the figure above, it shows that these three basic components in the TPACK framework indicate how these three bodies of knowledge extract, prod, and influence each other and create three new concepts, which are Pedagogical Content Knowledge, Technological Content Knowledge, and Technological Pedagogical Knowledge. For more details, the explanation as follow:

2.1.1. Content Knowledge (CK)

Content Knowledge (CK) refers to the comprehensive understanding and expertise that English teachers possess in their specific subject matter. This knowledge encompasses various aspects such as concepts, theories, evidence, and organizational frameworks within the field. It also includes familiarity with the best practices and established approaches for effectively conveying this information to students. For teachers to be effective, they must have a deep knowledge and comprehension of the subjects they teach, including a grasp of essential facts, concepts, theories, and procedures within the discipline. Additionally, they should be familiar with explanatory frameworks that help organize and connect ideas, as well as possess knowledge of the rules of evidence and proof that apply to their field (Shulman, 1986).

2.1.2. Pedagogical Knowledge (PK)

Pedagogical Knowledge (PK) refers to the practical knowledge and understanding that English teachers possess about the processes, methods, and approaches to teaching and learning. This component encompasses various aspects, including teaching strategies that cater to individual learning needs and effective methods for presenting subject matter to students (Kanuka, 2006). In essence, it encompasses the practicalities, procedures, and methods necessary for successful teaching and learning (Koehler et al., 2007). For example, this knowledge encompasses understanding the purposes, value, and aims of

education, as well as more specific areas such as general classroom management strategies, awareness of students' learning styles, course planning, and learning assessment. Pedagogical Knowledge equips teachers with the skills and techniques needed to create engaging and effective learning environments for their students.

2.1.3. Technological Knowledge (TK)

Technological Knowledge (TK) refers to teachers' knowledge of various technologies, technological tools, and resources, as well as their ability to effectively utilize them. TK encompasses understanding educational technologies and considering their potential applications within a specific subject area or classroom context. It involves recognizing when and how technology can facilitate or hinder learning and adapting to new technological advancements. As Koehler et al. (2007) suggest, TK encompasses all instructional materials, ranging from traditional tools like a blackboard to more advanced technologies. In essence, TK encompasses a wide range of technologies utilized in learning environments, reflecting the teacher's familiarity and proficiency with these tools (Margerum-Leys & Marx, 2002). Teachers with strong TK possess the skills and knowledge to effectively incorporate technology into their instructional practices.

2.1.4. Pedagogical Content Knowledge (PCK)

Pedagogical Content Knowledge (PCK) refers to teachers' knowledge of how to effectively teach specific subject areas within the pedagogical context. This knowledge encompasses various aspects such as curricula development, student assessment, and reporting of results. PCK involves understanding the relationship between pedagogy and the practicalities that support teaching practices. Its aim is to enhance teaching practices by establishing stronger connections between the content being taught and the pedagogical approaches used to convey it. PCK is specific to a particular subject area and involves transforming content into instruction. This may involve presenting the subject matter in various ways, adapting instructional materials, and catering to the individual needs and alternative ideas of students (Harris et al., 2009; Sahin, 2011). PCK equips teachers with the knowledge and skills to effectively bridge the gap between content knowledge and instructional strategies in order to facilitate meaningful learning experiences for their students.

2.1.5. Technological Content Knowledge (TCK)

Technological Content Knowledge (TCK) is a theoretical framework that is primarily defined and influenced by the capabilities and characteristics of technologies themselves. According to Slough and Connell (2006), TCK emphasizes the comprehensive intersection of technology and content. They illustrate this concept using the analogy of lenses, where technology and content lenses are used to view teaching and learning. In this framework, technology and content become intertwined, forming a

unified perspective. The lenses also serve to enhance teaching and learning by providing a more focused approach and facilitating collaborative professional development.

It is important to note that TCK differs from the broader Technological Pedagogical Content Knowledge (TPACK) framework in its conceptualization of technology. TPACK views technology as a distinct domain of knowledge separate from content and pedagogy, focusing on the areas where these three realms of knowledge overlap. In contrast, TCK places greater emphasis on the integration of technology and content, recognizing the interconnectedness and inseparable nature of these two components. By understanding and applying TCK, educators can harness the potential of technology to enhance content delivery and facilitate meaningful learning experiences. This framework provides a lens through which teaching and learning can be magnified, enabling a more focused and collaborative approach in professional development.

2.1.6. Technological Pedagogical Knowledge

Technological Pedagogical Knowledge (TPK) refers to teachers' understanding of how technology can shape and influence specific pedagogical practices. Margerum-Leys and Marx (2002) suggest that TPK involves grasping general pedagogical strategies and applying them to the use of particular technologies. It encompasses integrating technological tools and equipment with appropriate instructional designs and strategies while being aware of their strengths and limitations.

Sahin (2011) highlights the fact that many popular computer software applications are not specifically designed for educational purposes but rather for business, entertainment, communication, and social interaction. Therefore, it is the responsibility of teachers to go beyond the general uses of these technologies and effectively integrate them into instruction. TPK enables teachers to utilize technology in ways that align with pedagogical goals and enhance the learning experience for students. By understanding the affordances and limitations of technology, teachers can select and incorporate appropriate tools and methods to support their instructional practices.
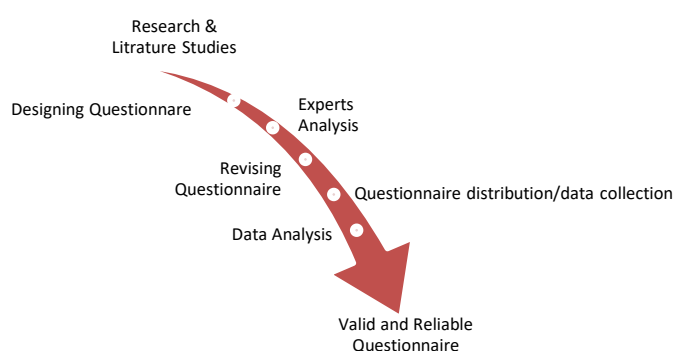
2.2. Questionnaire Development

Questionnaires are valuable tools for collecting data through a series of structured questions that respondents fill out or answer. They are commonly used for measuring factual variables, obtaining relevant information for the study's objectives, and ensuring high validity and reliability of the collected data.

In the process of developing a questionnaire, the first step involves determining the constructs of the research variables. These constructs are synthesized from theories that have been analyzed and discussed, as presented in theoretical studies or literature reviews. The constructs are described through conceptual definitions of the variables, including their dimensions and indicators that will be measured (Oyebanji & Jumoke, 2017). Based on these constructs, specific indicators are identified for measurement.

Subsequently, questionnaire items are created to measure the predetermined indicators, following the process outlined in steps 4 and 5 of instrument preparation and development. The design of the questionnaire items must align with the chosen questionnaire type that is appropriate for measuring the identified indicators of the variables under investigation (Oyebanji & Jumoke, 2017).

3. Method

This study follows the Research and Development (R&D) method as outlined by Borg and Gall (1983), which is a systematic approach used to create and validate educational products, including the development of a questionnaire. The development process in this study consists of seven steps, as depicted in Figure 2.

Figure 2. Seven steps of the development of TPACK online-teaching based questionnaire

The first step involved conducting research and reviewing relevant literature. Two samples of the questionnaire were used during this step, chosen for their clarity and comprehensibility. In the second step, the questionnaire was designed using a four-level scale, including "Very Agree," "Agree," "Disagree," and "Very Disagree." This choice of scale, as suggested by Chyung et al. (2017), helps avoid uncertain midpoints and increases participants' sensitivity to the scale.

Furthermore, the questionnaire was developed in two languages, English and Bahasa Indonesia, to accommodate the diverse participants. Three experts with different qualifications, based on their education, profession, and knowledge of TPACK, were involved in the revision process. After incorporating the experts' suggestions, the questionnaire was distributed to EFL teachers for data collection. The questionnaire link was shared globally through various social media platforms such as Facebook, Indonesian teachers' groups on Telegram, and Twitter.

A total of 65 responses were collected from EFL teachers in Java, Borneo, and West Nusa Tenggara. Data analysis was conducted using SPSS version 23.0, which eliminated 43 participants' responses based on the validity assessment of their answers. The population of this study consisted of EFL teachers from both private and state junior and senior high schools in Indonesia. However, the sample consisted of 43 EFL teachers from

Java, Borneo, and West Nusa Tenggara, who had varying teaching experience ranging from 1 to more than 20 years. The sampling method used in this study was non-probability convenience sampling, where participants were selected based on their willingness to voluntarily respond to the questionnaire and the validity of their responses as measured by SPSS version 23.0.

Table 1
Demographics variable.

Demographics Variable			Accepted Responds (N)	Percentage
Gender	Male		20	47%
	Female		23	53%
Location	Borneo		10	23%
	Java		15	35%
	West Nusa Tenggara		18	42%
Education	Bachelor		27	63%
	Magister		16	37%
Teaching Experience	< 5 years		9	21%
	5-10 years		13	30%
	10-15		12	28%
	15-20		9	21%
Level	Private Junior High School		15	35%
	Public Junior High School		10	23%
	Private Senior High School		6	14%
	Public Senior High School		12	28%
Total			43	

Table 1 provides a summary of the demographics of the participants, including gender, location, education, teaching experience, and school level. The table shows the number and percentage of eliminated and accepted responses in each category.

Given the quantitative design of this research, there were no specific limitations or criteria for participant selection. The study employed convenience sampling, which involves choosing members who are easily accessible and willing to participate (Bhardwaj, 2019). Therefore, all EFL teachers in junior and senior high schools who were willing to answer the questionnaire were included as part of the sample.

4. Findings and discussion

The construction of the questionnaire in this study was modified and adapted from various sources, namely Fuad et al. (2020), Loi (2021), and Schmid et al. (2020). These sources were selected because they are recently published research journals. However, the selection of specific statements for inclusion in this questionnaire was based on their

relevance to the understanding and application of TPACK in the context of online learning.

For instance, item PK 1 or item 16 in the questionnaire developed by Schmid et al. (2020) was not included in this study. The statement "I know how to assess student performance in a classroom" was deemed unrelated to the online learning-based context of this questionnaire. Therefore, careful consideration was given to selecting statements that align with the specific focus of this study and the online teaching environment.

Table 2
Item questionnaire construction.

Item construction	Sources		
	Schmid, et.al, (2020)	Fuad, et. al. (2020)	Loi (2021)
Technological Knowledge			
TK1		TK1	
TK2	TK1	TK3, TK4	
TK3	TK1, TK2, TK3, TK4	TK2	
TK4	TK1	TK3, TK4	
TK5		TK7	
Content Knowledge			
CK1		CK3	
CK2	CK2	CK2	
CK3			CK6
Pedagogical Knowledge			
PK1	PK2, Pk3	PK1, PK2, PK3, PK5	
PK2	PK4	PK4	
Pedagogical and Content Knowledge			
PCK1		PCK1	
PCK2		PCK2	
Technological Content Knowledge			
TCK1	TCK3	TCK1	
TCK2	TCK4		
Technological Pedagogical Knowledge			
TPK1	TPK1	TPK1	
TPK2	TPK2	TPK2	
TPK3		TPK2	

TPK4		TPK4
TPK5	TPK3, TPK4	TPK5
Technological Pedagogical Content Knowledge		
TPACK1		TPCK2
TPACK2	TPCK2	TPCK5
TPACK3	TPCK3	TPCK1
TPACK4	TPCK1	TPCK3
TPACK5		TPCK4

Based on the experts' comments, the questionnaire underwent minimal revisions. One of the experts emphasized the need for consistency between the English and Bahasa Indonesia versions of the questionnaire. As a result, eight revisions were made to ensure that the translations accurately conveyed the same meaning and context as the original questionnaire. Adjustments were made to ensure consistency between the two versions, such as modifying sentences and ensuring accurate translations. Another expert recommended adding numbers to each item in the questionnaire to improve organization and ease of reference. Taking this suggestion into account, numbers were incorporated into the questionnaire to facilitate clarity and help respondents navigate through the items more effectively.

Regarding the length of the questionnaire, a third expert expressed the opinion that it was quite long. While the term "short" was debated, it was decided to retain the 24-item length. This decision was based on the consideration that the questionnaire was indeed shorter compared to previous questionnaires developed by Maria et al. (2020), Fuad et al. (2020), and Loi (2021), which consisted of 54 items.

Overall, the feedback from the experts played a valuable role in refining the questionnaire. The revisions focused on ensuring consistency between language versions, organizing the items with numbered references, and acknowledging the questionnaire's relative brevity in comparison to previous studies. These adjustments aimed to improve the questionnaire's coherence and alignment with the research objectives, which involve investigating Technological Pedagogical Content Knowledge (TPACK) in the context of online teaching.

Simultaneously, the table provides an overview of the questionnaire items and their sources of construction. The items were derived from multiple sources, incorporating relevant statements from Schmid et al. (2020), Fuad et al. (2020), and Loi (2021). Technological Knowledge items, such as TK1, TK4, and TK5, were based on Schmid et al. (2020). CK2 drew upon insights from all three sources, while CK1 and CK3 were influenced by Loi's (2021) research. Similarly, Pedagogical Knowledge items incorporated elements from Schmid et al. (2020) and Fuad et al. (2020), and Pedagogical and Content Knowledge items were constructed based on Loi's (2021) work. The questionnaire also included items related to Technological Content Knowledge, Technological Pedagogical Knowledge, and Technological Pedagogical Content

Knowledge, with their sources specified accordingly. In summary, the questionnaire items were carefully selected and adapted from various sources, considering the feedback from experts and aligning with the research objectives.

Table 3
SPSS measurement.

Statements of Willingness to Understand and Implement The TPACK		$p < 0.05$	α
Technological Knowledge			
TK1	I am willing to learn how to solve technical problems in teaching	.70	
TK2	I am willing to try new technologies.	.61	
TK1	I am willing to use technology	.67	
TK2	I am willing to keep up with new technological developments that are important for me	.67	
TK3	I am willing to spend my time working with different technologies	.63	
Initial TK Subscale			**.84**
Content Knowledge			
CK1	I am willing to add sufficient knowledge about English language content.	.74	
CK2	I am willing to use various ways and strategies to develop my understanding of English language content	.73	
CK3	I am willing to use English in every activity	.63	
Initial CK Subscale			**.89**
Pedagogical Knowledge			
PK1	I am willing to add my knowledge about teaching techniques in VLE	.68	
PK2	I am willing to assess student performance in my VLE class	.67	
Initial PK Subscale			**.87**
Pedagogical and Content Knowledge			
PCK1	I am willing to adjust my teaching to what is currently understood or not understood by the students	.	
PCK2	I am willing to teach English content which needed by the students	.	
Initial PCK Subscale			**.76**
Technological Content Knowledge			
TCK 1	I am willing to learn about the technology that I can use to understand and practice English language material	.78	
TCK2	I am willing to use technology as the media for me to learn my content knowledge	.67	

Initial TCK Subscale		**.75**
Technological Pedagogical Knowledge		
TPK1	I am willing to find out the technology for an effective teaching approach	.76
TPK2	I am willing to find out technology that enhances student learning	.67
TPK3	Online teaching and learning have made me think more deeply about how technology can affect the teaching approach I use in class	.78
TPK4	I am willing to spend my time thinking critically about how to use technology in the classroom	.76
TPK1	I am willing to adjust the use of technology that I learn to various teaching activities	.74
Initial TPK Subscale		**.87**
Technological Pedagogical Content Knowledge		
TPACK1	I am willing to find out a technology to use in the classroom that enhances what I teach, how I teach, and what students learn.	.78
TPACK2	I am willing to find out the technology that enhances content for an English subject.	.77
TPACK3	I am willing to teach the appropriate subject by combining English language material, technology, and teaching approaches in my online class	.76
TPACK4	I am willing to use strategies that combine content, technology, and teaching approach in my online class	.70
TPACK5	I am willing to help other colleagues with using the content, technology, and teaching approaches in my school and/or district.	.73
Initial TPACK Subscale		**.92**

In terms of validity, item-total correlations were computed to assess the relationship between individual items and their respective subscales. Higher correlations indicate stronger associations. Among the technological knowledge subscale, TK1 displayed a correlation of 0.70, indicating a positive relationship with the overall subscale. Similarly, CK1 and CK2 within the content knowledge subscale showed correlations of 0.74 and 0.73, respectively, indicating a strong relationship with the overall subscale. TCK1 in the technological content knowledge subscale exhibited a correlation of 0.78, suggesting a positive association with the subscale. Additionally, TPACK1 and TPACK2 in the technological pedagogical content knowledge subscale displayed correlations of 0.78 and 0.77, respectively, signifying a strong relationship with the overall subscale.

Reliability was assessed using Cronbach's alpha, which measures internal consistency reliability. A higher Cronbach's alpha indicates greater reliability among the items within each subscale. The initial TK subscale demonstrated a Cronbach's alpha of 0.84, indicating good internal consistency. Similarly, the initial CK subscale displayed a Cronbach's alpha of 0.89, suggesting a high level of reliability. The initial PK subscale exhibited a Cronbach's alpha of 0.87, indicating good internal consistency among the items. The initial PCK subscale demonstrated a Cronbach's alpha of 0.76, suggesting acceptable reliability. The initial TCK subscale displayed a Cronbach's alpha of 0.75, indicating reasonable internal consistency. Lastly, the initial TPACK subscale showed a high Cronbach's alpha of 0.92, signifying excellent internal consistency reliability.

These findings provide support for the validity and reliability of the questionnaire items within their respective subscales. The item-total correlations suggest that the items are significantly associated with their respective subscales, indicating their relevance in measuring the constructs of interest. The high Cronbach's alpha values indicate that the items within each subscale are internally consistent, suggesting that they are measuring a similar underlying construct. Overall, these results provide confidence in the questionnaire's ability to effectively assess willingness to understand and implement the TPACK framework.

The TPACK study was initiated in 2006, and since then, numerous comprehensive studies have been conducted in this field, including the development of a short questionnaire. The short questionnaire was designed with concise statements and a reduced number of items to allow respondents to complete it quickly. This consideration is important because teachers often have multiple responsibilities and limited time to participate in research. By using a simple and easily understandable questionnaire, respondents can grasp its meaning and purpose without much difficulty. Ensuring that respondents understand the questions in the desired manner is crucial, as highlighted by Sreejesh et al. (2014). Therefore, creating a short questionnaire provides a convenient and comfortable experience for the respondents.

While a short questionnaire offers time efficiency, it is essential to address the issue of item validity. Some items in the research did not demonstrate high validity. This may be due to excessive focus on the characteristics of a short questionnaire, which led to fewer items being included. To achieve high validity, each indicator should ideally consist of at least three items. It is important to have multiple items for each indicator to ensure the representation of the construct in case any item is found invalid during the validation process (Bashooir & Supahar, 2018). However, in the present questionnaire, the CK and PK domains only had two items, which is fewer than the other domains like TK, PCK, TCK, PCK, and TPACK, which had three or more items. This suggests that maintaining the label of a "short questionnaire" for TPACK is challenging since each domain of TPACK should ideally have three or more items. Therefore, while the goal of building a short questionnaire is to make it convenient for respondents, it is crucial to ensure its

validity and reliability, not only through item validity measurement but also from the perspective of experts.

The involvement of experts in the questionnaire development process is important. Translating a questionnaire into another language is a complex task (Tsang et al., 2017). The validation process involves ensuring the accuracy of language translation, the appropriate use of punctuation, and the overall consistency of the questionnaire to align with the intended concept. This process is known as linguistic validation, where the aim is to create an adapted questionnaire that maintains comparability to the original version in terms of meaning and concept (Nipa et al., 2020). Professionals carefully examine each component and the overall structure, ensuring that the adapted questionnaire is sourced from qualified and reputable references (Elangovan & Sundaravel, 2021).

Selecting a qualified questionnaire source is an important consideration in questionnaire development. Researchers need to choose appropriate indicators for each item from well-established and respected previous studies. This process is part of the qualitative phase in questionnaire development, which involves an extensive literature review, identification of constructs and measures, development of questionnaire items, and seeking expert advice on the inclusion of constructs and pre-selected items in the research instrument (Nikitina et al., 2016).

Furthermore, several factors influence questionnaire development, such as the gender of participants, the level of workplace in which English teachers operate, and their teaching experience. Gender plays a significant role in education and research participation. Female EFL teachers tend to be more active in survey research, displaying better engagement in answering questions, providing clarifications, and responding promptly. Women often exhibit greater competency in areas such as empathy, intuition, teamwork, self-control, and care (Xin et al., 2019). In the education field, females have shown greater pedagogical knowledge than males, while males tend to possess stronger technological knowledge (Öz, 2015). This finding is reflected in the TPACK scores, where female teachers tend to have higher scores in PK compared to CK and TK in the writing context (Surayya & Asrobi, 2020).

The level of the school where English teachers work also impacts their participation in research. Junior school teachers are more actively involved in teacher development, resulting in a higher number of participants from junior high schools compared to senior high schools (Tindowen et al., 2020). The reasons behind this phenomenon require further investigation, as limited studies have explored differences between teachers in senior and junior high schools based on professional demands, loyalty, and other factors.

Teaching experience also influences the willingness of English teachers to participate in voluntary research. In this study, a large majority of the respondents (75.4%) had relatively short teaching experience of 0-9 years, while a smaller portion (24.6%) had longer experience of 10-20 years. This finding contrasts with the statement by Buenvinida et al. (2020) that teachers with greater experience are better prepared. However, novice teachers may be more open to technology, while experienced teachers

may have more commitments and responsibilities, leaving less time for voluntary research (Thien et al., 2014).

While the majority of participants in this questionnaire had bachelor's degrees, it is important to note that the level of education does not solely determine the willingness of English teachers to participate in voluntary research. The high number of teachers with bachelor's degrees in the research sample aligns with the overall educational landscape in Indonesia, where a majority of teachers hold bachelor's degrees (Kemenristekdikti, 2018). Teachers' participation in research also connects to the professionalism principle outlined in the legal law of the Republic of Indonesia in 2003, emphasizing the need for teachers and lecturers to enhance the quality of education (Dewan Perwakilan Rakyat Indonesia, 2005).

English teachers in Indonesia are active in online platforms, particularly on Facebook and Telegram. Therefore, conducting an online survey research proves to be a viable choice in Indonesia. Web surveying in academic research is a relatively new phenomenon in a rapidly evolving technological context (Allen & Roberts, 2010). This questionnaire development, based on an online survey format, highlights the importance of teachers not only as educators but also as active contributors to research, contributing to significant transformations in the education process.

5. Conclusion

Ensuring the validity and reliability of research findings requires the use of a valid and reliable instrument, such as a well-constructed questionnaire. The process of building a questionnaire involves essential steps like item construction, expert validation, and measuring with statistical software like SPSS. These steps are interdependent and crucial in establishing a questionnaire that is ready to be used for assessing the TPACK of EFL teachers in online learning.

Furthermore, it is worth mentioning that this questionnaire can serve as a valuable resource for other researchers and teachers in different fields. By adapting and modifying the questionnaire to suit their respective areas of expertise, such as economics, science, art courses, and so on, researchers and teachers can effectively measure the TPACK or related constructs within their specific domains.

In summary, establishing a valid and reliable instrument, such as a well-constructed questionnaire, is essential for obtaining trustworthy research findings. The steps involved in building a questionnaire, including item construction, expert validation, and statistical measurement, are integral to this process. Future researchers should ensure an adequate number of items in each domain when measuring TPACK using Cronbach's alpha. Moreover, other researchers and teachers can adapt this questionnaire to suit their specific areas of expertise and assess similar constructs within their respective fields.

Acknowledgement

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