

MEASURING INDONESIAN EFL TEACHERS' TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE IN THE POST-PANDEMIC ERA: DO DEMOGRAPHICAL ISSUES MATTER?

By

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Abstract:

This research aimed to measure Indonesian EFL teachers' Technological Pedagogical Content Knowledge (TPACK) in the post-pandemic era. EFL teachers must have balanced technological knowledge, pedagogical knowledge, content knowledge, technological pedagogical knowledge, pedagogical content knowledge, technological pedagogical content knowledge, and web content knowledge since the Covid-19 pandemic has altered mainstream educational practices. Face-to-face instruction has shifted to online instruction, affecting EFL teachers' TPACK. The researcher hypothesized a significant difference in gender, age, and length of teaching experience in Indonesian EFL teachers' TPACK, particularly during online learning. The participants of this study were 24 Indonesian EFL teachers from 22 different schools and affiliations. An adopted TPACK questionnaire was administered to measure the Indonesian EFL teachers' TPACK during online learning. It consists of 25 total items. The data were calculated using SPSS version 26 software to determine each datum's U-value, mean, and standard deviation. This research revealed no significant difference in all aspects of TPACK based on the EFL teachers' gender. Moreover, there was no significant difference in the five aspects of TPACK based on the five age categories, except in Content Knowledge (CK). Furthermore, there was also no statistical difference in all aspects of TPACK based on the EFL teachers' length of teaching experience. However, age and teaching experience, particularly, contribute to shaping the Indonesian EFL teachers' level of TPACK.

Keywords: EFL teachers, Demographical issues, TPACK, Post Pandemic Era

INTRODUCTION

Incorporating information and communication technology (ICT) into the educational sector has established new social stereotypes and gender disparities (Markauskaite, 2006a). Previous studies have been conducted to examine the relationship between age and gender to TPACK

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(Altun & Akyıldız, 2017; Bağcı & ATAR, 2019a; Castéra et al., 2020a; Hosseini & Kamal, 2013; Jang & Tsai, 2012; Kavanoz et al., 2015a; Keser et al., 2015; Khan & Pattern, 2018a; Koh & Chai, 2014; Koh & Sing, 2011; Markauskaite, 2006b; Raman, 2014a; Redmond & Peled, 2018a; Rubach & Lazarides, 2021; Sadaf et al., 2012a; Scherer et al., 2018a; Schmid et al., 2021a; Süzük & Akıncı, 2021a; Teo, 2008a; Tondeur et al., 2018; Uçar et al., 2014). Most researchers examine the relationship between gender and TPACK in normal conditions. However, in this study, the researcher investigated the relationship between gender, age, teaching experience, and Indonesian EFL teachers' TPACK, particularly in the post-pandemic era. The researcher hypothesized that the Indonesian EFL teachers' TPACK levels significantly increase due to the massive use of ICT during the instruction process. Nevertheless, the increase during pandemic covid 19 need investigating.

As we have known that the covid-19 pandemic has altered mainstream educational practices, and face-to-face instruction has been shifted to online instruction (Ayu & Pratiwi, 2021). Schools are pushing to implement distance education or online learning, e-learning, distance education, correspondence education, external studies, flexible learning, and wide-open online courses (Mohd & Shahbodin, 2021). The Ministry of Education and Culture review findings revealed that online learning between teachers and students is highly effective, mainly when changes occur in a short time. Students understood online learning materials in 33.51 percent of cases; 30.90 percent understood the material well, and 5.64 percent understood the subject. According to the evaluation results, 25.34 percent of students believed teachers could give course material online, 45.56 percent delivered the material well; and 15.84 percent gave the material exceptionally well (Hamid et al., 2020). It is inevitable that educators use a blended learning and employ a web-based technology in all subjects including EFL

As a result, information and communication technology (ICT) plays a pivotal role in supporting online instruction (Kavanoz et al., 2015b; Ringotama, 2020; Valtonen et al., 2015a). Current advances in computer and information technology, as well as the widespread availability of PCs, productivity software, multimedia, and network resources, have prompted the creation and implementation of new and innovative teaching methodologies (Kavanoz et al., 2015a). Innovative technologies and learning management systems for teaching, learning, and assessment have advanced by giving a working solution for educators and allowing

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policymakers to apply information technology to cover coursework during this time (Yusnilita, 2020). Thus, it is inevitable to promote learning through web-based technology in all courses

The instruction shifting leads to heterogeneous challenges for both students and teachers. Some teachers are concerned about the disparities in student achievement in traditional and online settings. However, effective online learning needs careful instructional planning and preparation and a well-organized design and development process. The uniformity of the instructions is influenced by the design process and careful study of various design decisions. However, in most cases, this exact design procedure would be overlooked during these emergency revisions (Wheeler et al., 2005).

Teachers are grappling with a new generation of pupils who have grown up with technology as an ever-present tool (Tondeur et al., 2017a). Teachers must be proficient in all three types of information. However, more significantly, they must be able to combine all three types of knowledge for technology integration to occur in Education (Tondeur et al., 2017b). Integration of technology and efficient use of the internet into the teaching-learning processes is unavoidable in the age of technology and the internet. However, insufficient access to technology, a lack of time, and a lack of technical skills have all been mentioned as reasons teachers need to feel prepared to use technology in their classes (Tondeur et al., 2012).

The integration of ICT into instruction is widely-known as TPACK. (Koehler et al., 2013) claimed that TPACK is a form of emergent knowledge that encompasses all three "core" components (content, pedagogy, and technology). These seven categories are briefly defined as follows:

- 1) Content knowledge (CK) is teachers' knowledge about the subject matter to be learned or taught. In the case of science, this would include knowledge of scientific facts and theories and evidence-based reasoning (Koehler et al., 2013b).
- 2) Pedagogical knowledge (PK) is teachers' deep knowledge about the processes and practices or teaching and learning methods. It includes knowledge about techniques or methods used in the classroom, the nature of the target audience, and strategies for evaluating student understanding (Koehler et al., 2013b).

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- 3) PCK is consistent with and similar to Shulman's idea of knowledge of pedagogy that applies to specific content. PCK covers the core business of teaching, learning, curriculum, assessment, and reporting (Koehler et al., 2013b).
- 4) Acquiring TK enables a person to accomplish various tasks using information technology. This conceptualization of TK does not posit an "end state" but instead sees it developmentally as evolving over a lifetime (Koehler et al., 2013b).
- 5) TCK is an understanding of how technology and content impact and constrain one another. Teachers must be able to master more than just the subject matter they teach; they must also be thoroughly aware of how the subject matter (or the types of representations that can be generated) can be altered by using specific technologies (Koehler et al., 2013b).
- 6) TPK is a knowledge of how teaching and learning might change due to using specific technologies in specific ways. This process includes understanding the pedagogical benefits and drawbacks of various technological instruments concerning discipline- and developmentally appropriate educational designs and tactics (Koehler et al., 2013b).
- 7) TPACK is a form of emergent knowledge that encompasses all three "core" components (content, pedagogy, and technology). Knowledge of technological pedagogical content develops from interactions between content, pedagogy, and technology knowledge (Koehler et al., 2013b).

Upon all empirical and theoretical basis, the researchers investigated the relationship between gender, age, teaching experience, and Indonesian EFL teachers' TPACK, particularly in the post-pandemic era. The expected outcome are the contribution to current knowledge to enrich broader sciences.

Therefore, three research questions are formulated to seek deeper information about Indonesian EFL teachers' TPACK in three main domains as follows:

- 1) Does TPACK level differ among Indonesian EFL teachers concerning gender in the post-pandemic era?
- 2) Does the TPACK level differ among Indonesian EFL teachers concerning their age in the post-pandemic era?

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- 3) Does the TPACK level differ among Indonesian EFL teachers' length of teaching experience in the post-pandemic era?

METHOD

Design

This quantitative research design measured the Indonesian EFL teachers' Technological Pedagogical Content Knowledge (TPACK), across gender and length of experience during online learning. The researcher hypothesized a significant difference in gender, age, and length of teaching experience in Indonesian EFL teachers' TPACK, particularly during online learning.

Participant

The participants of this study were 24 Indonesian EFL teachers comprising both males (n=9) and females (n=15) from 22 different education levels, ranging from junior up to higher Education in both urban and suburban areas. The participants' age ranged from 26-35 years old (n=6), 36-45 years old (n=13), and 46-55 years old (n=5). In terms of teaching experience, the participants were divided into five groups: 1-5 years (n=3), 6-10 years (n=7), 11-15 years (n=8), 16-20 years (n=2), and above 20 years (n=4). Therefore, the entire sample (N = 24) participated in the quantitative stage, and 30 participants volunteered to participate in the qualitative stage. In addition, convenience sampling was employed to recruit all participants, which means they were selected based on availability.

Instrument

An online questionnaire developed by (Bagheri, 2020) was employed to collect the data for this research. It consists of 34 questions based on the research variable of this study. Three questions demand demographic information about gender, age, and teaching experience. Thirty-one 7 Likert-scale questions were demanding information on EFL teachers' TPACK comprising five items of TK, three items of CK, six items of PK, two items of PCK, four items of TPK, six items of TPACK, and five items of WCK. Each item is classified into

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1: Strongly Disagree, 2: Disagree, 3: Slightly Disagree, 4: Undecided, 5: Slightly Agree, 6: Agree, and 7: Strongly agree (Bagheri, 2020b).

The first step was to assess the validity and reliability of the instrument. In terms of overall validity, the instrument was validated using Pearson Correlation. The result showed that TK ($r = .856$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$), CK ($r = .756$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$), TPK ($r = .944$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$), TCK ($r = .928$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$), TPACK ($r = .935$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$), and WCK ($r = .897$, $N = 24$, $r_{table} = .3882$, $Sig. (2\text{-tailed}) = .000$). From this statistical analysis, it can be concluded that the instrument employed in this research was valid. While in terms of overall reliability, Cronbach's Alpha was .979, which suggested high internal consistency.

Data Collecting Technique

These data are collected and analyzed by using statistical methods. The online questionnaire was designed to collect the data for this research. We managed 34 questions based on the research variable of this study. Three questions demand demographic information about gender, age, and teaching experience. Thirty-one 7 Likert-scale questions are demanding information on EFL teachers' TPACK comprising five items of TK, three items of CK, six items of PK, two items of PCK, four items of TPK, six items of TPACK, and five items of WCK. Each item is classified into 1: Strongly Disagree, 2: Disagree, 3: Slightly Disagree, 4: Undecided, 5: Slightly Agree, 6: Agree, and 7: Strongly agree.

Data Analysis Technique

Due to the limited number of research participants, therefore normality and heterogeneity of the sample were not statistically met. Henceforth, non-parametric statistical analysis was employed to analyze the data. The quantitative data were analyzed using descriptive statistics. Mann-Whitney U Test was used to investigate if there is a significant difference in Gender to TPACK. On the other hand, the researcher employed Kruskal-Wallis Test to measure whether there is a significant difference between age and the length of teaching experience in Indonesian Indonesian EFL teachers' TPACK. Thus, this study used a statistical approach to analyze the instrument's reliability and validity and answer the research questions. The data were calculated using SPSS version 26 software to determine each

datum's P-value, H-values, mean, and standard deviation. On the other hand, the arrangement of citation in the text and list of reference employ an automatic model using Mendeley cite(Turmudi, 2020a,p.59).

RESULT AND DISCUSSION

This chapter is devoted to presenting the results and findings of the research and their discussion. It is divided into two main sections. The first section is about the research finding, and the second section is the discussion which explains the researcher's response to the findings. This study involved descriptive quantitative research. Therefore, the researcher used an adopted TPACK questionnaire as the instrument to accomplish the result.

Results

1. Gender and Technological Knowledge (TK)

The purpose of this section is to answer the first research question. The first question reads:" Is there any difference in TPACK levels among Indonesian EFL teachers concerning gender? A series of Mann-Whitney U Tests were conducted to examine if male (n=9) and female (n=15) EFL teachers differed in TPACK. It revealed no significant difference in the Technological Pedagogical Content Knowledge (TPACK) levels of male Indonesian EFL teachers with their gender. A more detailed statistical analysis is shown in the following table:

Table 1. Mann White U Test Result of comparing TPACK levels about Indonesian EFL teachers' gender

Component	Gender	N	Mean	SD	U	Z	P
TK	Male	9	25.67	5.612	62.500	-.300	.765
	Female	15	25.73	5.092			
CK	Male	9	18.11	2.028	53.500	-.855	.393
	Female	15	17.00	3.525			
TPK	Male	9	32.33	4.583	55.000	-.749	.454
	Female	15	33.73	5.444			
PCK	Male	9	22.11	4.256	65.500	-.121	.904
	Female	15	22.27	3.674			
TPACK	Male	9	31.44	5.981	48.000	-1.168	.243
	Female	15	33.27	5.837			
WCK	Male	9	29.22	4.494	67.000	-.030	.976
	Female	15	29.27	4.891			

***Significant at .05 level**

The table above shows Mann-Whitney U results for the differentiation of the Indonesian EFL teachers' TPACK levels related to gender. It revealed that the Indonesian

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EFL teachers reported a high level of TPACK in TPK (M=33.73, n=15), (M=32.33, n=9), and TPACK (M=33.27, n=15), and (M=31.44, n=9). However, the table above also shows that all components of TPACK, such as PK, CK, TCK, PCK, TPK, TPACK, and WCK, have the p-values 0.765, 0.393, 0.454, 0.904, 0.243, and 0.976 respectively. All these components have greater p-values than 0.05 (P>0.05). These values are insignificant at 0.05, indicating no significant difference between male and female EFL teachers in Technological Pedagogical Content Knowledge (TPACK). In addition, the effect sizes calculated for the above significant differences are TK (.06), indicating a minimal effect of Gender on TK, CK (.17), indicating a minimal effect of Gender on CK, TPK (.09), indicating a minimal effect of Gender on TPK, PCK (.18) indicating a very small of Gender on PCK, TPACK (.15) indicating a very small of Gender on TPACK, and WCK (.02) indicating a minimal effect of Gender on WCK.

2. Age and Technological Pedagogical Content Knowledge (TPACK)

This section aims to answer the second research question. The second question reads: "Is there any difference in TPACK levels among Indonesian Indonesian EFL teachers with their age? A series of Kruscall-Wallis tests were conducted to examine if EFL teachers aged 26-35 years (n=6), 36-45 years (n=13), and 46-55 years (n=5) differed in TPACK. It revealed no significant difference in the Technological Pedagogical Content Knowledge (TPACK) levels to their age. A more detailed statistical analysis is shown in the following table:

Table 2. Kruscall-Wallis Test Result comparing TPACK levels of Indonesian EFL teachers' age

Component	Age	N	Mean	SD	H	df	P
TK	26-35	6	24.00	6.197	1.823	2	.402
	36-45	13	27.23	4.711			
	46-55	5	23.80	4.764			
CK	26-35	6	15.00	4.195	5.971	2	.051
	36-45	13	18.46	2.332			
	46-55	5	17.60	1.673			
TPK	26-35	6	30.50	6.025	2.867	2	.238
	36-45	13	34.77	4.850			
	46-55	5	32.40	3.578			
PCK	26-35	6	20.00	4.733	5.670	2	.059
	36-45	13	23.85	2.882			
	46-55	5	20.60	3.362			
TPACK	26-35	6	30.33	6.088	4.042	2	.132
	36-45	13	34.46	5.607			
	46-55	5	30.40	5.459			

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WCK	26-35	6	27.83	4.446	5.448	2	.066
	36-45	13	30.85	4.598			
	46-55	5	26.80	4.147			

*Significant at .05 level

The table above shows the Kruskal Wallis test results for differentiating the Indonesian EFL teachers' TPACK levels related to age. It revealed that the Indonesian EFL teachers aged 36-45 reported a high level of TPK (M=34.77, n=13) and TPACK (M=34.46, n=13). However, the table above also shows that all components of TPACK, such as PK, CK, TCK, PCK, TPK, TPACK, and WCK, have the p-values 0.402, 0.051, 0.238, 0.059, 0.132, and 0.66 respectively. All these components have more significant p-values than 0.05 ($P > 0.05$). These values are insignificant at 0.05, indicating no significant difference in Technological Pedagogical Content Knowledge (TPACK) to age. In addition, the effect sizes calculated for the above significant differences are TK (.37), indicating a medium effect of age on TK; CK (1.19), indicating a significant effect of age on CK, TPK (.58), indicating a significant effect of age on TPK, PCK (1.15) indicating a significant effect of age on PCK, TPACK (.82) indicating a significant effect of age on TPACK, and WCK (1.11) indicating a significant effect of age on WCK. It can be concluded that the participants can distinguish between two different types of knowledge of technology (Bagheri, 2020b)

3. Teaching Experience and Technological Pedagogical Content Knowledge (TPACK)

This section aims to answer the third research question. The third question reads: "Is there any difference in TPACK levels among Indonesian EFL teachers concerning their teaching experience? A series of Kruskal-Wallis tests were conducted to examine if EFL teachers taught 26-35 years (n=6), 36-45 years (n=13), and 46-55 years (n=5) differed in TPACK levels. It revealed no significant difference in the Technological Pedagogical Content Knowledge (TPACK) levels in their teaching experience. A more detailed statistical analysis is shown in the following table:

Table 3. Kruskal-Wallis Test Result comparing TPACK levels concerning Indonesian EFL teachers' age

Component	Teaching Experience (years)	N	Mean	SD	H	df	P
TK	1-5	3	27.00	5.292	2.970	4	.563
	6-10	7	26.86	3.485			
	11-15	8	25.25	7.086			
	16-20	2	28.50	3.536			

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Component	Teaching Experience (years)	N	Mean	SD	H	df	P
CK	>20	4	22.25	3.775	2.546	4	.636
	1-5	3	14.00	6.083			
	6-10	7	18.14	1.864			
	11-15	8	17.88	3.091			
	16-20	2	18.00	.000			
TPK	>20	4	17.50	1.915	1.635	4	.802
	1-5	3	33.00	6.557			
	6-10	7	34.43	5.127			
	11-15	8	33.25	6.319			
	16-20	2	32.50	3.536			
PCK	>20	4	31.50	3.416	4.154	4	.386
	1-5	3	23.67	4.163			
	6-10	7	22.57	3.259			
	11-15	8	22.63	4.926			
	16-20	2	22.00	1.414			
TPACK	>20	4	19.75	3.202	4.295	4	.368
	1-5	3	31.67	8.021			
	6-10	7	34.29	5.057			
	11-15	8	32.00	6.503			
	16-20	2	37.00	1.414			
WCK	>20	4	29.25	5.560	3.192	4	.526
	1-5	3	29.00	7.000			
	6-10	7	30.43	3.599			
	11-15	8	29.38	5.041			
	16-20	2	31.50	4.950			
	>20	4	26.00	4.320			

The table above shows the Kruskal Wallis test results for differentiating the Indonesian EFL teachers' TPACK levels related to teaching experience. It revealed that the Indonesian EFL teachers taught for 16-20 years reported a high level of TPACK (M=37, n=2). However, the table above also shows that all components of TPACK, such as TK, CK, TPK, PCK, TPACK, and WCK, have the p-values 0.563, 0.636, 0.802, 0.386, 0.368, and 0.526, respectively. All these components have more significant p-values than 0.05 ($P > 0.05$). These values are not significant at the 0.05 level, indicating no significant difference in Technological Pedagogical Content Knowledge (TPACK) with teaching experience exists. In addition, the effect sizes calculated for the above significant differences are TK (.60), indicating a large effect of teaching experience on TK; CK (.51), indicating a significant effect of teaching experience on CK; and TPK (.33), indicating a medium effect of teaching

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experience on TPK, PCK (.84) indicating a significant effect of teaching experience on PCK, TPACK (.87) indicating a significant effect of teaching experience on TPACK, and WCK (.65) indicating a significant effect of teaching experience on WCK.

Discussion

This research aimed to measure Indonesian EFL teachers' TPACK in the post-pandemic era, particularly regarding demographical issues, such as gender, age, and teaching experience. The statistical findings indicate that overall there is no significant difference in EFL teachers' TPACK' levels concerning their gender, age, and teaching experience. This evidence adds to the consistent findings of past research on the relation between demographical issues such as gender and age and TPACK levels (Bağcı & ATAR, 2019b; Castéra et al., 2020b; Khan & Pattern, 2018b; Redmond & Peled, 2018b; Schmid et al., 2021b; Süzük & Akıncı, 2021b; Teo, 2008b). However, this finding does not support past research, which suggested significant differences in computer attitudes by gender (Markauskaite, 2006b; Raman, 2014b). Another notable finding was that gender has a minimal effect on Indonesian EFL teachers' TPACK' levels. Meanwhile, age still has a medium to an enormous effect on Indonesian EFL teachers' TPACK levels. Moreover, age and teaching experience have proven to be the demographical issue contributing to the most considerable effect on Indonesian EFL teachers' TPACK. This evidence supports previous research on the relationship between teaching experience to TPACK levels (Chen, 2014; Ifinedo et al., 2020; Özgür, 2020; Tondeur et al., 2017b). One possible explanation for these findings is that teachers' positive attitude toward incorporating ICT related to their length of teaching experience and greater access to ICT contribute to the more prominent effect on TPACK levels. Therefore, it supports the previous research on the relationship between EFL teachers' positive attitudes toward the use of ICT (Farjon et al., 2019; Mare et al., 2019; Martinovic & Zhang, 2012; Sadaf et al., 2012b; Scherer et al., 2018b; Valtonen et al., 2015b).

CONCLUSION AND SUGGESTION

This research investigated the difference in Indonesian EFL teachers' TPACK concerning demographical issues such as gender, age, and teaching experience. It was found that there is no significant difference in the level of Indonesian EFL teachers' TPACK regarding gender, age, and teaching experience. Generally, the teachers reported a lower score

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in Content Knowledge (CK) with the three demographical issues. Meanwhile, the teachers reported medium to high scores in Technological Knowledge (TK), Pedagogical Knowledge (PK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Content Knowledge (TPACK), and Web Content Knowledge (WCK). This research also found that teaching experience and age significantly shaped the EFL teachers' TPACK. Moreover, the teachers' positive attitude towards incorporating ICT during the instruction shapes the teachers' level of TPACK significantly.

TPACK is a multi-dimensional construct that can provide EFL teachers with a framework to address technology integration in instruction. The results from this study indicated that the TPACK survey was reliable and valid. Practical implications resulting from the findings of this study are employing TPACK as a framework for decision-making. It also implies that a teacher program provides better guidance for preservice teachers toward understanding the holistic concept of pedagogy, content, and technology and thus eventually improving the teaching and learning process. However, several participants and affiliations in this research are limited and less representative of urban and suburban areas. Therefore, further studies involving more excellent participants and representative affiliation are endorsed to gain a more representative result of the research.

BIO-PROFILE:

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REFERENCES

- Altun, T., & Akyıldız, S. (2017). Investigating Student Teachers' Technological Pedagogical Content Knowledge (Tpack) Levels. *European Journal of Education Studies*, 3(5), 467–485. <https://doi.org/10.5281/zenodo.555996>
- Ayu, M., & Pratiwi, Z. F. (2021). the Implementation of Online Learning in English Language Teaching During Pandemic: the Teachers'Voice. *Journal of Research on Language Education*, 2(2), 93–99.
- Bağcı, H., & ATAR, C. (2019a). An Investigation of Pre-Service English Teachers' Self-Efficacy in Web Pedagogical Content Knowledge. *Sakarya University Journal of Education*, 550–566. <https://doi.org/10.19126/suje.591804>
- Bağcı, H., & ATAR, C. (2019b). An Investigation of Pre-Service English Teachers' Self-Efficacy in Web Pedagogical Content Knowledge. *Sakarya University Journal of Education*, 550–566. <https://doi.org/10.19126/suje.591804>
- Bagheri, M. (2020a). Validation of Iranian EFL teachers' technological pedagogical content knowledge (TPACK) scale. *TESL-EJ*, 24(2), 1–20.
- Bagheri, M. (2020b). Validation of Iranian EFL teachers' technological pedagogical content knowledge (TPACK) scale. *TESL-EJ*, 24(2), 1–20.
- Castéra, J., Marre, C. C., Yok, M. C. K., Sherab, K., Impedovo, M. A., Sarapuu, T., Pedregosa, A. D., Malik, S. K., & Armand, H. (2020a). Self-reported TPACK of teacher educators across six countries in Asia and Europe. *Education and Information Technologies*, 25(4), 3003–3019. <https://doi.org/10.1007/s10639-020-10106-6>
- Castéra, J., Marre, C. C., Yok, M. C. K., Sherab, K., Impedovo, M. A., Sarapuu, T., Pedregosa, A. D., Malik, S. K., & Armand, H. (2020b). Self-reported TPACK of teacher educators across six countries in Asia and Europe. *Education and Information Technologies*, 25(4), 3003–3019. <https://doi.org/10.1007/s10639-020-10106-6>
- Chen, Y. (2014). *Interrelationship between Stages of Concern and Technological , Pedagogical , ... Related papers*.
- Farjon, D., Smits, A., & Voogt, J. (2019). Technology integration of pre-service teachers explained by attitudes and beliefs, competency, access, and experience. *Computers and Education*, 130, 81–93. <https://doi.org/10.1016/j.compedu.2018.11.010>
- Hamid, R., Sentryo, I., & Hasan, S. (2020). Online learning and its problems in the Covid-19 emergency period. *Jurnal Prima Edukasia*, 8(1), 86–95. <https://doi.org/10.21831/jpe.v8i1.32165>

Syafi'i & Anam

- Hosseini, Z., & Kamal, A. (2013). A Survey on Pre-Service and In-Service Teachers' Perceptions of Technological Pedagogical Content Knowledge (TPCK). *Malaysian Online Journal of Educational Technology*, 1(2), 1–7.
- Ifinedo, E., Rikala, J., & Hämäläinen, T. (2020). Factors affecting Nigerian teacher educators' technology integration: Considering characteristics, knowledge constructs, ICT practices and beliefs. *Computers and Education*, 146, 103760. <https://doi.org/10.1016/j.compedu.2019.103760>
- Jang, S.-J., & Tsai, M.-F. (2012). Exploring the TPACK of Taiwanese elementary mathematics and science teachers with respect to use of interactive whiteboards. *Computers & Education*, 59(2), 327–338. <https://doi.org/10.1016/j.compedu.2012.02.003>
- Kavanoz, S., Yüksel, H. G., & Özcan, E. (2015). Pre-service teachers' self-efficacy perceptions on Web Pedagogical Content Knowledge. *Computers & Education*, 85, 94–101. <https://doi.org/10.1016/j.compedu.2015.02.005>
- Keser, H., Karaoğlan Yılmaz, F. G., & Yılmaz, R. (2015). TPACK Competencies and Technology Integration Self-Efficacy Perceptions of Pre-Service Teachers. *İlköğretim Online*, 14(2), 1193–1207. <https://doi.org/10.17051/ilo.2015.65067>
- Khan, Z., & Pattern, R. (2018a). Measuring the Technological Pedagogical Content Knowledge (TPACK) of pre-service Teachers in relation to their Gender and Stream. *American International Journal of Research in Humanities, Arts and Social Science*, 22(1), 50–55.
- Koehler, M. J., Mishra, P., & Cain, W. (2013a). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13–19. <https://doi.org/10.1177/002205741319300303>
- Koh, J. H. L., & Chai, C. S. (2014). Teacher clusters and their perceptions of technological pedagogical content knowledge (TPACK) development through ICT lesson design. *Computers and Education*, 70, 222–232. <https://doi.org/10.1016/j.compedu.2013.08.017>
- Koh, J. H. L., & Sing, C. C. (2011). Modeling pre-service teachers' technological pedagogical content knowledge (TPACK) perceptions: The influence of demographic factors and TPACK constructs. *ASCILITE 2011 - The Australasian Society for Computers in Learning in Tertiary Education*, 2011, 735–746.
- Mare, A., Jormanainen, I., & Tedre, M. (2019). Eritrean pre-service teachers' perceptions of and proficiency with TPACK and ICT integration in education. *ACM International Conference Proceeding Series*, 582–588. <https://doi.org/10.1145/3362789.3362804>

- Markauskaite, L. (2006). Gender issues in preservice teachers' training: ICT literacy and online learning. *Australasian Journal of Educational Technology*, 22(1), 1–20. <https://doi.org/10.14742/ajet.1304>
- Martinovic, D., & Zhang, Z. (2012). Situating ICT in the teacher education program: Overcoming challenges, fulfilling expectations. *Teaching and Teacher Education*, 28(3), 461–469. <https://doi.org/10.1016/j.tate.2011.12.001>
- Mohd, C. K. N. C. K., & Shahbodin, F. (2021). Issues and challenges from teachers' perceptions in creating online learning in the midst of covid-19 pandemic. *Journal of Theoretical and Applied Information Technology*, 99(12), 3039–3049.
- Özgür, H. (2020). Relationships between teachers' technostress, technological pedagogical content knowledge (TPACK), school support and demographic variables: A structural equation modeling. *Computers in Human Behavior*, 112(July), 106468. <https://doi.org/10.1016/j.chb.2020.106468>
- Raman, A. (2014). TPACK Confidence of Pre-service Teachers in Universiti Utara Malaysia. *Mediterranean Journal of Social Sciences*, 5(22), 167–175. <https://doi.org/10.5901/mjss.2014.v5n22p167>
- Redmond, P., & Peled, Y. (2018). Exploring TPACK among pre-service teachers in Australia and Israel. *British Journal of Educational Technology*, 0(0), 1–15. <https://doi.org/10.1111/bjet.12707>
- Ringotama, A. A. (2020). Pre- Service Teachers ' Perception and Vision about TPACK and Its Implementation Pre- Service Teachers ' Perception and Vision about TPACK and Its Implementation Arrizalu Arsa Ringotama. *Celt: A Journal of Culture, English Language Teaching & Literature*, 20(1).
- Rubach, C., & Lazarides, R. (2021). Addressing 21st-century digital skills in schools – Development and validation of an instrument to measure teachers' basic ICT competence beliefs. *Computers in Human Behavior*, 118, 106636. <https://doi.org/10.1016/j.chb.2020.106636>
- Sadaf, A., Newby, T. J., & Ertmer, P. A. (2012). Exploring pre-service teachers' beliefs about using Web 2.0 technologies in K-12 classroom. *Computers & Education*, 59(3), 937–945. <https://doi.org/10.1016/j.compedu.2012.04.001>
- Scherer, R., Tondeur, J., Siddiq, F., & Baran, E. (2018). The importance of attitudes toward technology for pre-service teachers' technological, pedagogical, and content knowledge: Comparing structural equation modeling approaches. *Computers in Human Behavior*, 80, 67–80. <https://doi.org/10.1016/j.chb.2017.11.003>
- Schmid, M., Brianza, E., & Petko, D. (2021). Self-reported technological pedagogical content knowledge (TPACK) of pre-service teachers in relation to digital technology use in lesson plans. *Computers in Human Behavior*, 115, 106586. <https://doi.org/10.1016/j.chb.2020.106586>

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- Süzük, E., & Akinci, T. (2021). Comparing Pre-Service Teachers' Self-Confidence Levels in Technological Pedagogical Content Knowledge in Terms of Several Variables. *Journal of Education and Learning*, 10(1), 82.
<https://doi.org/10.5539/jel.v10n1p82>
- Teo, T. (2008). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology*, 24(4), 413–424.
<https://doi.org/10.14742/ajet.1201>
- Tondeur, J., Aesaert, K., Prestridge, S., & Consuegra, E. (2018). A multilevel analysis of what matters in the training of pre-service teacher's ICT competencies. *Computers and Education*, 122, 32–42. <https://doi.org/10.1016/j.compedu.2018.03.002>
- Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2017). A comprehensive investigation of TPACK within pre-service teachers' ICT profiles: Mind the gap! *Australasian Journal of Educational Technology*, 33(3), 46–60.
<https://doi.org/10.14742/ajet.3504>
- Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, 59(1), 134–144.
<https://doi.org/10.1016/j.compedu.2011.10.009>
- Turmudi, D. (2020). English scholarly publishing activities in the industrial revolution 4.0 : What , Why , and How ? *ELTEJ*, 3(1), 52–63.
<http://journal2.uad.ac.id/index.php/eltej/article/view/1890>
- Uçar, M. B., Demir, C., & Hiğde, E. (2014). Exploring the Self-confidence of Preservice Science and Physics Teachers towards Technological Pedagogical Content Knowledge. *Procedia - Social and Behavioral Sciences*, 116, 3381–3384.
<https://doi.org/10.1016/j.sbspro.2014.01.768>
- Valtonen, T., Kukkonen, J., Kontkanen, S., Sormunen, K., Dillon, P., & Sointu, E. (2015a). The impact of authentic learning experiences with ICT on pre-service teachers' intentions to use ICT for teaching and learning. *Computers & Education*, 81, 49–58. <https://doi.org/10.1016/j.compedu.2014.09.008>
- Wheeler, S., Kelly, P., & Gale, K. (2005). The influence of online problem-based learning on teachers' professional practice and identity. *ALT-J*, 13(2), 125–137.
<https://doi.org/10.1080/09687760500104088>
- Yusnilita, N. (2020). The Impact of Online Learning: Student's Views. *ETERNAL (English Teaching Journal)*, 11(1), 783–793.
<https://doi.org/10.26877/eternal.v11i1.6069>