The Digital Teaching Landscape: Investigating the Roles of Interest, Self-Efficacy, and Experience in Shaping TPACK

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Abstract

Purpose –This study aims to analyze the relationship between interest, self-efficacy, and practical teaching experience concerning prospective early childhood education teachers' perceptions of Pedagogical Knowledge of Technology Content.

Design/methods/approach – This research employs an associative correlational quantitative design, involving 84 students from the Early Childhood Islamic Education Study Program at UIN Sunan Kalijaga Yogyakarta. Data was collected through both offline and online questionnaires and analyzed using multiple linear regression techniques. This analysis assesses the predictive capacity of interest, self-efficacy, and teaching experience in determining TPACK within the perceptions of prospective ECCE teachers. Data analysis was aided by the statistical software SPSS 26 for Windows.

Findings – The statistical tests indicate that interest, when considered individually, does not exhibit a positive and significant effect on TPACK. Conversely, self-efficacy and teaching practice experience, when examined separately, demonstrate a positive and significant influence on TPACK. Moreover, when these variables are collectively examined, interest, self-efficacy, and teaching practice experience collectively impact TPACK, showcasing a robust relationship of 75.4%. However, it's worth noting that there are some inconsistencies in the results concerning the impact of interest on TPACK, which may be attributed to a lack of specific context and a detailed examination of respondents' interest levels.

Research implications/limitations – This study primarily focuses on elucidating the interplay between interest, self-efficacy, and practical teaching experience in TPACK development.

Practical implications – These practical implications are envisioned to enhance the quality of early childhood education and prepare prospective ECCE teachers to confront the evolving technological landscape.

Originality/value – This research contributes to an enhanced understanding of the interrelationships between interest, self-efficacy, and practical teaching experience in shaping prospective teachers' perceptions of TPACK, offering novel insights into the professional development of prospective ECCE teachers.

Keywords Pedagogical Knowledge of Technology Content (TPACK), Self-efficacy, Practical teaching experience

Paper type Research paper

1. Introduction

The development of technology in various fields, including education, has become a significant influence in today's world. Education plays a crucial role in nurturing a generation with high-quality skills, enhancing the quality of life, and serving as a cornerstone for the progress of a nation (Aprilita & Trisnawati, 2022). Teachers are among the key elements in the educational process. Therefore, it is imperative to prepare future teachers to be professionals capable of fulfilling their roles according to the standards of the teaching profession (Ariani et al., 2016). In the modern era with rapid technological advancements, it is essential to cultivate skilled and competitive educators to contribute to the nation's progress (Gümüş, 2022). The preparation of high-quality human resources extends beyond students to include teachers, who are a crucial factor in enhancing the quality of education in Indonesia. The current educational curriculum is also shifting towards the integration of technology. The integration of technology in education has become an urgent necessity in the 21st century (Gümüş, 2022).

The most critical skills for teachers in the 21st century encompass creative thinking, critical thinking, communication, collaboration, and technological literacy. Meanwhile, Cretu emphasizes the importance of creativity, critical thinking, communication, and collaboration skills for teachers to prepare students for the demands of life and work in the 21st century (Cretu, 2017). Weeks et al. conclude that professional development is essential to educate and equip teachers with specific strategies for implementing critical thinking, communication, and technological literacy skills. Overall, this paper suggests that teachers must develop and exemplify these skills to prepare students for success in the 21st century (Weeks et al., 2020). Currently, technological proficiency for teachers is crucial to bridge the gap between pedagogical skills and content. Technology-based learning is embodied in the concept of Technological Pedagogical Content Knowledge (TPACK). The TPACK framework builds upon Shulman's description of Pedagogical Content Knowledge (PCK) to illustrate teachers' understanding of educational technology and how PCK and technology knowledge are interconnected (Rosyid, 2015). Consequently, learning can be structured using technology (Rosyid, 2015). Still, it does not guarantee TPACK proficiency. Furthermore, teachers' experiences also impact their ability to utilize technology in the classroom (Suyamto et al., 2020).

Several studies also indicate a relationship between teachers' experience and their TPACK. Koh et al. found that prospective teachers' perceptions of TPACK were influenced by their perceptions of course experiences that support the development of TPACK components such as technological knowledge and technological pedagogical knowledge (Koh et al., 2013). Koh et al. found that teachers' perceptions of design disposition and learning design practices had a direct relationship with their perceptions of TPACK (Koh et al., 2015). This is further supported by Gill & Dalgarno's study, which found that the level of ICT (Information and Communications Technology) usage in professional placements, mentoring teacher expectations and practices, school culture, and resources significantly influence pre-service teachers' TPACK development (Gill & Dalgarno, 2017). Baran et al. also found a positive relationship between teachers' education strategies and pre-service teachers' TPACK (Baran et al., 2019). Antony et al. found that teacher qualifications and teaching experience significantly influenced biology teachers' TPACK (Antony et al., 2019). Saudelli & Ciampa found that teachers' pedagogical knowledge and years of teaching experience significantly influenced their decisions regarding mobile technology integration (Saudelli & Ciampa, 2016).

Furthermore, self-efficacy aids individuals in decision-making and readiness to face obstacles (Aprilita & Trisnawati, 2022). Self-preparedness in a teacher enhances their sense of responsibility in their profession. Several studies have shown a positive relationship between self-efficacy and TPACK in prospective teachers. Feng & Xia found that personal teaching effectiveness significantly predicted TPACK competency during online internships (Feng & Xia, 2023). López-Vargas et al. found a significant relationship between cognitive style, self-efficacy, technological knowledge, and TPACK (López-Vargas et al., 2017). Considering the aforementioned issues, this research tests several hypotheses: teaching interest positively affects TPACK, self-efficacy

positively influences TPACK, teaching experience has a positive impact on TPACK, and collectively, Teaching Interest, Self-Efficacy, and Teaching Experience positively affect TPACK.

2. Methods

2. 1. Research Design

This research employs an associative correlational quantitative research design (Sugiyono, 2019), aiming to investigate the relationships among various variables (Suryani & Hendriyadi, 2015). Specifically, it explores the relationships between the variables of interest, self-efficacy, and teaching practice experience with Technological Pedagogical Content Knowledge (TPACK) as perceived by prospective early childhood education teachers.

2. 2. Population and Sample

The population for this study consists of prospective early childhood education teachers, specifically active students in the Early Childhood Islamic Education Program at the State Islamic University of Sunan Kalijaga Yogyakarta, who have completed teaching practice, totaling 84 students. In research, having a representative sample size is crucial for accurate and generalizable results. Ross et al. suggest that if parametric tests are employed, the sample size should range between 30 to 500 samples (Ross, 2014). In the case of a correlational design, the sample size should not be less than 30 (Gall et al., 2003). Therefore, given the small population size of 84 students in this study, the entire population is included as the sample.

2. 3. Research Instruments

This study employs various instruments to comprehensively assess multiple dimensions. The Interest Questionnaire measures the enthusiasm of prospective early childhood education teachers toward teaching, encompassing statements that delve into their interests and motivations. The Self-Efficacy Scale is utilized to evaluate the self-confidence of educators in developing and integrating TPACK, with questions assessing individuals' confidence in their technological competence for early childhood education.

Additionally, a Survey of Teaching Practice Experience is administered to gain insights into the practical teaching experiences of prospective early childhood educators. This survey explores the duration, types, and scope of their teaching involvement. Lastly, the TPACK Questionnaire is used to collect information about the TPACK skills of prospective early childhood education teachers. This questionnaire is adapted from previous research by Azma Afia and Ulfah et al., enhancing its credibility (Asma Afia, 2020; Ulfah & Erlina, 2022).

2.4. Data Collection

After the research instruments have been prepared and validated, the researcher distributes the questionnaires and surveys to the selected sample of students in the Early Childhood Islamic Education Program at UIN Sunan Kalijaga. Data collection can be conducted both in-person and through online platforms, using Google Forms.

2.5. Data Analysis

The collected data will be analyzed using multiple linear regression statistical techniques. This analysis aims to determine the extent to which interest, self-efficacy, and teaching practice experience can predict TPACK as perceived by prospective early childhood education teachers. Data analysis will be facilitated by the statistical software SPSS 26 for Windows, involving three stages: descriptive analysis, classic assumption testing, and hypothesis testing.

3. Result

This experiment was conducted in May 2023, targeting prospective early childhood education teachers, particularly senior students from the 2019 cohort of the Islamic Early Childhood Education program at UIN Sunan Kalijaga Yogyakarta. The total number of students involved was 83. They were provided with questionnaires and instructions on how to complete them. After

completing the instrument testing, the next step was to analyze and formulate the results of the instrument testing.

3.1 Descriptive Statistics

Below is the table presenting the results of the descriptive analysis of the variables: interest, self-efficacy, teaching practice experience, and TPACK. Descriptive analysis results for the interest variable are shown in table 1. This table displays the frequency distribution of respondents in various interest categories, along with the mean and standard deviation values.

Table 1. Descriptive Statistics for the Interest Variable

Category	Range	Frequency	%	Mean	Standard Deviation
Low	X< 16	4	4,8%	25,77	4,258
Medium	$16,4 \le X < 25$	30	35,7%		
High	$X \ge 25,6$	50	59,5%		
Total		84	100%		

Source: Primary Data Processed, May 2023

Based on table 1, it can be observed that interest falls into the high category. This is indicated by the average score of 25.77 and a standard deviation of 4.258, with 59.5% of the interest statements falling into the high category.

Table 2 presents the results of the descriptive analysis for the self-efficacy variable. The table provides an overview of the frequency distribution of respondents in various self-efficacy categories, along with mean and standard deviation values.

Table 2. Descriptive Statistics for the Self-Efficacy Variable

Category	Range	Frequency	%	Mean	Standard Deviation
Low	X< 18	1	1,2%	31,24	4,106
Medium	$18,7 \le X < 29$	24	28,6%		
High	$X \ge 29,3$	59	70,2%		
Total		84	100%		

Source: Primary Data Processed, May 2023

Based on table 2, it can be observed that self-efficacy falls into the high category. This is indicated by the average score of 31.24 and a standard deviation of 4.106, with 70.2% of the self-efficacy statements falling into the high category.

Table 3 presents the results of the descriptive analysis for the teaching practice experience variable. The table provides information about the frequency distribution of respondents in various teaching practice experience categories, along with mean and standard deviation values.

Table 3. Descriptive Statistics for the Teaching Practice Experience Variable

Category	Range	Frequency	%	Mean	Standard Deviation
Low	X< 14	2	2,4%	20,88	3,605
Medium	$14 \le X < 22$	48	57,1%		
High	$X \ge 22$	34	40,5%		
Total		84	100%		

Source: Primary Data Processed, May 2023

Based on table 3, it can be observed that teaching practice experience falls into the high category. This is indicated by the average score of 20.88 and a standard deviation of 3.605, with 40.5% of the teaching practice experience statements falling into the high category.

Descriptive analysis results for the Technological Pedagogical Content Knowledge (TPACK) variable are shown in Table 4. This table provides an overview of the frequency distribution of respondents in various TPACK categories, along with mean and standard deviation values.

Table 4. Descriptive Statistics for TPACK

Category	Range	Frequency	%	Mean	Standard Deviation
Low	X< 35	1	1,2 %	55,37	8,735
Medium	35 ≤ X < 54	36	42,9 %		
High	X ≥ 55	47	56 %		
Total		84	100 %		

Source: Primary Data Processed, May 2023

Based on Table 4, it can be observed that Technological Pedagogical Content Knowledge (TPACK) falls into the high category. This is indicated by the average score of 55.37 and a standard deviation of 8.735, with 56% of the TPACK statements falling into the high category. Before conducting hypothesis testing, this research performed classical assumption tests, including normality testing, multicollinearity testing, and heteroskedasticity testing. Here are the results of the three classical assumption tests:

3.2 Normality Test
Data normality was assessed using the Kolmogorov-Smirnov test, and the results are presented in table 5.

Table 5. Normality Test

Kolmogorov - Smirnov		
Asymp.Sig	Criteria	Remarks
0,200	>0,05	Normally Distributed

Based on the normality test, the significance value is 0.200, which is greater than 0.05. Therefore, it can be concluded that the residual values are normally distributed, as indicated by the significance value (Sig.) being greater than 0.05 (α).

3.3 Multicollinearity Test
Table 6 presents the results of the Multicollinearity Test, which assesses the collinearity statistics for the variables. This table includes Tolerance and VIF values for each component: Interest, Self-Efficacy, and Teaching Practice Experience.

Table 6. Multicollinearity Test

Component	Collinearity Statistics	
	Tolerance	VIF
Interest	0,726	1,378
Self-Efficacy	0,513	1,951
Teaching Practice Experience	0,669	1,495

The results of the multicollinearity test indicate that there is no multicollinearity, as evidenced by the VIF values for the three independent variables being < 10 and the Tolerance values > 0.1.

3.4 Heteroskedasticity Test
Table 7 presents the results of the Heteroskedasticity Test, which examines the significance value (Sig.) for each component: Interest, Self-Efficacy, and Teaching Practice Experience. Based on table 7, it can be determined that there is no heteroskedasticity in these three independent variables. This is because all six independent variables have significance values greater than 0.05.

Table 7. Heteroskedasticity Test

Component	Sig.
Interest	0,309
Self-Efficacy	0,407
Teaching Practice Experience	0,894

After the classical assumption tests, the next step is to test the hypotheses using multiple linear regression analysis techniques, including the t-test, the F-test, and the coefficient of determination.

3.5 t-Test

Table 8 presents the results of the t-test analysis, displaying the unstandardized coefficients, standardized coefficients, t-values, and significance values (Sig.).

Table 8. t-Test

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-0,215	4,063		-0,053	0,958
Interest	-0,221	0,134	-0,108	-1,652	0,102
Self-Efficacy	1,275	0,165	0,599	7,741	0,000
Teaching Practice Experience	1,026	0,164	0,424	6,247	0,000

Based on the results in table 8, the regression equation is obtained as follows: Y = -0.215 - 0.221 Interest + 1.275 Self-Efficacy + 1.026 Teaching Practice Experience. Based on the table above, it can be concluded that the results of the multiple regression analysis and interpretation are as follows: *First*, the significance value (Sig.) for the influence of Interest on TPACK is 0.102, which is greater than 0.05. The t-value of 1.652 is less than 1.990, indicating that there is no significant influence of Interest on TPACK. Second, the significance value (Sig.) for the influence of Self-Efficacy on TPACK is 0.000, which is less than 0.05. The t-value of 7.741 is greater than 1.990, indicating that there is a significant influence of Self-Efficacy on TPACK. Third, the significance value (Sig.) for the influence of Teaching Practice Experience on TPACK is 0.000, which is less than 0.05. The t-value of 6.247 is greater than 1.990, indicating that there is a significant influence of Teaching Practice Experience on TPACK.

3.6 F-Test

Table 9, referred to as the F-Test, presents the analysis results involving the sum of squares for the model, degrees of freedom (df), mean square, F-value, and significance value (Sig.).

Table 9. F-Test

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4775,819	3	1591,940	81,756	0,000
	Residual	1557,741	80	19,472		
	Total	6333,560	83			

Based on the table 9, it can be determined that the significance value for the simultaneous influence of X1, X2, and X3 on Y is 0.000, which is less than 0.05. The F-value of 81.756 is greater than the tabulated F-value of 2.72. Therefore, it can be concluded that there is a simultaneous influence of Interest, Self-Efficacy, and Teaching Practice Experience on TPACK.

3.7 Coefficient of Determination

Table 10, referred to as the Coefficient of Determination, presents various key statistical indicators related to the model's performance. These indicators include the coefficient of determination (R), R Square, Adjusted R Square, and the standard error of the estimate.

Table 10. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,868	0,754	0,745	4,41268

Based on the table above, the R Square value is 0.754, indicating that Interest, Self-Efficacy, and Teaching Practice Experience collectively influence TPACK by 75.4%.

4. Discussion

4.1 The Influence of Interest (X1) on Technological Pedagogical Content Knowledge (TPACK) (Y)

In the descriptive analysis, it is revealed that the Interest variable (X1) falls into the high category, as evidenced by a mean value of 25.77 and a standard deviation of 4.258, accounting for 59.5%. However, in the partial significance test or t-test, the Interest variable (X1) has a significance value of 0.102, which means that the Sig. value > 0.05. Consequently, the Interest variable (X1) does not have a significant effect on Technological Pedagogical Content Knowledge (TPACK) (Y).

This finding contradicts the opinion of Khaerunnas & Rafsanjani, who argue that strong interest in individuals can support their readiness to become professional teachers (Khaerunnas & Rafsanjani, 2021). Didactic interest and teachers' self-efficacy also influence teachers' instructional practices (Schiefele & Schaffner, 2015), and teachers interested in topics related to cognitive growth and impactful learning are vital for TPACK. However, research results on interest and TPACK show inconsistent results; for example, Wati et al. found that the interest in becoming a teacher has no relationship or influence on readiness to become a teacher (Wati et al., 2022). Suyamto et al. also found that while the interest in becoming a teacher is one of the factors influencing teacher motivation and performance, it does not guarantee the ability of TPACK for teachers (Suyamto et al., 2020).

Furthermore, factors such as educational background, teaching experience, technology resources, institutional support, and professional development also play significant roles (Suyamto et al., 2020). It can be explained that the interest in becoming a teacher may be related to the desire to share knowledge and help students, but it is not directly related to understanding how to use technology effectively in teaching. TPACK involves a deep understanding of how to integrate technology with pedagogical and content knowledge, not just an interest in becoming a teacher. While an interest in becoming a teacher is an essential factor in choosing this career, it is not sufficient to directly influence the development of TPACK. TPACK requires a deep understanding of technology, pedagogy, and content, as well as a willingness to continue learning and adapting to changes. In today's evolving era, many countries are competing to use technology as efficiently as possible. Additionally, skilled and competent human resources are required (Syofyan et al., 2020). Prospective teachers can prepare themselves for the teaching profession by enhancing their skills and talents, dedicating themselves to achieving the necessary competencies. This will stimulate curiosity and provide what is needed to pursue a career in education (Wati et al., 2022).

4.2 The Influence of Self-Efficacy (X2) on Technological Pedagogical Content Knowledge (TPACK) (Y)

Self-efficacy (X2) obtains a mean value of 31.24 with a standard deviation of 4.106, categorizing it as high, accounting for 70.2%. This indicates that the self-efficacy variable has a more significant influence than other variables. Likewise, in the t-test results, the Self-Efficacy variable (X2) has a significant positive impact on Technological Pedagogical Content Knowledge (TPACK) with a Sig. value of 0.000, where Sig. < 0.05. The results suggest that early childhood education student teachers have high confidence and self-belief in their profession, keeping pace with modern times. Internal factors, such as self-efficacy, in attribution theory are reasons for an individual's behavior. This shows that UIN Sunan Kalijaga's early childhood education students have a high level of confidence in pursuing the teaching profession in today's modern era. Someone with confidence in their abilities to perform a task is more likely to succeed in completing that task.

Similarly, López-Vargas et al. found a significant relationship between cognitive style, self-efficacy, technology knowledge, and TPACK (López-Vargas et al., 2017). Overall, research indicates that pre-service teacher's self-efficacy beliefs about technology integration are positively related to their TPACK competence. Thus, considering the individual teacher's factors and complex educational systems, the enhancement of pre-service teachers' information technology integration self-efficacy is a prerequisite for the school-level information technology environment and also affects the school's information technology environment. Therefore, the positive relationship between teacher's information technology integration self-efficacy and TPACK should be highly regarded by educational practitioners.

This aligns with the opinion of Rajip Sidik et al., stating that computer self-efficacy influences teacher's technological, pedagogical, and content competence (Sidik et al., 2022). Furthermore, Zeng et al. suggest that TPACK and information technology integration self-efficacy interact with each other (Zeng et al., 2022). When teachers have a strong belief in information technology integration and believe that learning and using technology are engaging, important, and beneficial, they will have a stronger motivation to improve information technology integration skills and achieve a higher level.

These results indicate several key points: High self-efficacy in teachers can enhance motivation and persistence in developing TPACK (Barni et al., 2019; Gale et al., 2021). High self-efficacy in teachers can improve their ability to use technology effectively (Gomez et al., 2022; Pan, 2020), encourage experimentation and innovation in learning(Barton & Dexter, 2019; Gale et al., 2021; Gomez et al., 2022). High self-efficacy in teachers can influence collaborative attitudes and behaviors, as well as leadership in the context of TPACK (Diamah et al., 2022; Wang & Zeng, 2022). Therefore, it can be concluded that high self-efficacy in teachers can have a positive impact on the development of TPACK. This occurs because high self-efficacy increases motivation, effective technology use skills, willingness to experiment, and collaborative attitudes and leadership. Teachers with high self-efficacy will be more enthusiastic and skilled in developing TPACK, which in turn will have a positive impact on student learning.

4.3 The Influence of Teaching Practice Experience (X3) on Technological Pedagogical Content Knowledge (TPACK) (Y)

The results of descriptive statistical analysis of the Teaching Practice Experience variable (X3) fall into the high category. This is evident from the mean value of 20.88 and a standard deviation of 3.605, accounting for 40.5%. Similarly, in the t-test results, the Teaching Practice Experience variable (X3) has a significant positive influence on Technological Pedagogical Content Knowledge (TPACK) (Y) with a Sig. value of 0.000, where Sig. < 0.05. These results indicate that the teaching practice experience of early childhood education student teachers has a significant impact on their readiness to embrace the teaching profession, especially in keeping up with modern times. Experience is a crucial aspect in an individual's career choice process. Experience represents a learning process that greatly influences a person in their work. Experience is an arena for understanding, executing, and equipping oneself for future success. When one has adequate teaching experience, their readiness for teaching in the future is fulfilled.

Additionally, when examining the t-test results, it becomes evident that the Teaching Practice Experience variable (X3) has a significant positive impact on Technological Pedagogical Content Knowledge (TPACK) (Y). The statistical significance is reflected in a Sig. value of 0.000, where Sig. < 0.05. This finding implies that the teaching practice experience of student teachers in early childhood education plays a crucial role in shaping their readiness to embrace the teaching profession, particularly in the context of adapting to modern educational practices. It's important to recognize that experience is a fundamental component of an individual's career decision-making process. Experience represents a valuable learning journey that significantly influences a person's competence and confidence in their work. Through experience, individuals gain a deeper understanding of their profession, develop essential skills, and prepare themselves for future success. In the context of teaching, when an individual accumulates substantial teaching experience, it contributes significantly to their preparedness and readiness for a successful career in education.

This finding aligns with the research by Kurniasari & Rahmawati, which found that Field Practice Experience has a significantly positive effect on an individual's readiness to become a teacher (Kurniasari & Rahmawati, 2016). Additionally, it is consistent with the research by Roisah, which suggests that Teaching Practice has a significantly positive influence on an individual's readiness to become a teacher (Roisah & Margunani, 2018). Previous research findings indicate that teaching experience affects the approach to technology use. This indicates that teaching experience plays a significant role in influencing teachers' approaches and motivation to use technology in teaching. Teachers' perceptions of TPACK are also influenced by teaching experience and their perceptions of relevant course experiences. Teachers with diverse teaching

experiences and positive perceptions of relevant course experiences tend to have better perceptions of their TPACK (Koh et al., 2013, 2015). This suggests that teaching experience can enrich teachers' TPACK knowledge. Furthermore, teachers' perceptions of TPACK are shaped by their teaching experiences and their perceptions of relevant course experiences. Those with diverse teaching experiences and positive perceptions of relevant course experiences tend to have more favorable perceptions of their TPACK. This suggests that teaching experience not only enhances pedagogical knowledge but also enriches teachers' TPACK knowledge, ultimately benefiting their ability to integrate technology into their teaching practices.

Furthermore, environmental factors such as the level of technology use in professional placements, mentor teacher expectations and practices, school culture, and resources have a significant impact on the development of teachers' TPACK (Gill & Dalgarno, 2017). These factors are also related to teaching experience, as teachers in environments that encourage technology use and provide professional support tend to have better TPACK development. The positive impact of teaching experience on TPACK can also be seen in the differences in TPACK between novice and experienced teachers. Experienced teachers tend to have higher scores in pedagogical knowledge and pedagogical content knowledge, while novice teachers have higher scores in technology knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK (Gill & Dalgarno, 2017; Nazari et al., 2019). This indicates that teaching experience provides opportunities for teachers to gradually develop their TPACK knowledge over time. Thus, teachers with years of teaching experience influence their decisions regarding mobile technology integration (Saudelli & Ciampa, 2016). Teachers with more teaching experience tend to have more mature pedagogical knowledge and a better understanding of how to best integrate technology into teaching.

5. Conclusion

Teaching interest, self-efficacy, and teaching experience are interconnected and influence the development of teachers' TPACK. The positive impact of teaching experience on TPACK is evident in the differences between novice and experienced teachers in their TPACK knowledge. Continuous professional development involving diverse teaching experiences and contextual support becomes crucial in enhancing TPACK. However, although the Interest variable did not show a significant partial impact on TPACK in this study, this may be due to variations in interest levels within the research sample or the context it covers. Therefore, future research should carefully consider contextual factors and variations in interest levels when investigating the relationship between interest and TPACK. To enhance TPACK, it is essential for prospective early childhood education teachers to pay attention to and develop their teaching interest, self-efficacy, and teaching practice experience as part of their professional development. Ultimately, teachers with a strong passion for teaching and high self-efficacy tend to have more successful teaching experiences and greater job satisfaction, particularly in the context of TPACK.

Declarations

Author contribution statement

Sarah Salsabila the presented idea and data taker. Bahbibi Rahmatullah developed the theory of self-efficacy, Technological Pedagogical Content Knowledge (TPACK), and early childhood education. Hafidh 'Aziz analyzes the method. All authors discussed the results and contributed to the final manuscript.

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Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of interests statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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References

Antony, M. K., Paidi, Subali, B., Pradana, S. P., Hapsari, N., & Astuti, F. E. C. (2019). Teacher's TPACK Profile: The Affect of Teacher Qualification and Teaching Experience. *Journal of Physics: Conference Series*, *1397*(1), 12054. https://doi.org/10.1088/1742-6596/1397/1/012054

Aprilita, A., & Trisnawati, N. (2022). Pengaruh Efikasi Diri, Kecerdasan Emosional dan Pengalaman Pengenalan Lapangan Persekolahan (Plp) terhadap Kesiapan Berkarir Menjadi Guru. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(4), 5494–5502. https://doi.org/10.31004/edukatif.v4i4.3267

Ariani, R. P., Martono, T., & Indriayu, M. (2016). Pengaruh progam pengalaman lapangan (PPL) terhadap kesiapan menjadi guru pada mahasiswa FKIP UNS Angkatan 2011. *Jurnal Pendidikan Bisnis Dan Ekonomi, UNS*, *1*(1), 2–21. https://jurnal.uns.ac.id/bise/article/view/17974

Asma Afia, A. (2020). *Pengaruh Minat Menjadi Guru dan Praktik Pengalaman Lapangan Terhadap Pemahaman Kompetensi Mengajar Mahasiswa Pendidikan Ekonomi Fkip Universitas Pancasakti Tegal Tahun Akademik 2019/2020* [Universitas Pancasakti]. http://repository.upstegal.ac.id/2708

Baran, E., Canbazoglu Bilici, S., Albayrak Sari, A., & Tondeur, J. (2019). Investigating the impact of teacher education strategies on preservice teachers' TPACK. *British Journal of Educational Technology*, *50*(1), 357–370. https://doi.org/10.1111/bjet.12565

Barni, D., Danioni, F., & Benevene, P. (2019). Teachers' Self-Efficacy: The Role of Personal Values and Motivations for Teaching. *Frontiers in Psychology*, *10*, 1–7. https://doi.org/10.3389/fpsyg.2019.01645

Barton, E. A., & Dexter, S. (2019). Sources of teachers' self-efficacy for technology integration from formal, informal, and independent professional learning. *Educational Technology Research and Development*, *68*(1), 89–108. https://doi.org/10.1007/s11423-019-09671-6

Cretu, D. (2017). Fostering 21st Century Skills For Future Teachers. The European Proceedings of Social and Behavioural Sciences. *European Proceedings of Social and Behavioural Sciences*, 672–681. https://doi.org/10.15405/epsbs.2017.05.02.82

Diamah, A., Rahmawati, Y., Paristiowati, M., Fitriani, E., Irwanto, I., Dobson, S., & Sevilla, D. (2022). Evaluating the effectiveness of technological pedagogical content knowledge-based training program in enhancing pre-service teachers' perceptions of technological pedagogical content knowledge. *Frontiers in Education*, *7*, 1–11.

https://doi.org/10.3389/feduc.2022.897447

Feng, M., & Xia, X. (2023). Examining the Association Between Pre-service Teachers' Self-efficacy and TPACK Competencies in Online Internships Under COVID-19. *2023 11th International Conference on Information and Education Technology (ICIET)*, 354–359. https://doi.org/10.1109/ICIET56899.2023.10111329

Gale, J., Alemdar, M., Cappelli, C., & Morris, D. (2021). A Mixed Methods Study of Self-Efficacy, the Sources of Self-Efficacy, and Teaching Experience. *Frontiers in Education*, *6*, 1–16. https://doi.org/10.3389/feduc.2021.750599

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational Research: An Introduction* (7th ed.). Pearson.

Gill, L., & Dalgarno, B. (2017). A qualitative analysis of pre-service primary school teachers' TPACK development over the four years of their teacher preparation programme. *Technology, Pedagogy and Education*, *26*(4), 439–456. https://doi.org/10.1080/1475939X.2017.1287124

Gomez, F. C., Trespalacios, J., Hsu, Y.-C., & Yang, D. (2022). Exploring Teachers' Technology Integration Self-Efficacy through the 2017 ISTE Standards. *TechTrends*, *66*(2), 159–171. https://doi.org/10.1007/s11528-021-00639-z

Gümüş, A. (2022). *Twenty-First-Century Teacher Competencies and Trends in Teacher Training BT - Educational Theory in the 21st Century: Science, Technology, Society and Education* (Y. Alpaydın & C. Demirli (eds.); pp. 243–267). Springer Nature Singapore. https://doi.org/10.1007/978-981-16-9640-4_11

Khaerunnas, H., & Rafsanjani, M. A. (2021). Pengaruh Pengenalan Lapangan Persekolahan (PLP), Minat Mengajar, dan Prestasi Belajar terhadap Kesiapan Menjadi Guru bagi Mahasiswa Pendidikan Ekonomi. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(6), 3946–3953. https://doi.org/10.31004/edukatif.v3i6.1353

Koh, J. H. L., Chai, C. S., Hong, H.-Y., & Tsai, C.-C. (2015). A survey to examine teachers' perceptions of design dispositions, lesson design practices, and their relationships with technological pedagogical content knowledge (TPACK). *Asia-Pacific Journal of Teacher Education*, *43*(5), 378–391. https://doi.org/10.1080/1359866X.2014.941280

Koh, J. H. L., Woo, H.-L., & Lim, W.-Y. (2013). Understanding the relationship between Singapore preservice teachers' ICT course experiences and technological pedagogical content knowledge (TPACK) through ICT course evaluation. *Educational Assessment, Evaluation and Accountability*, *25*(4), 321–339. https://doi.org/10.1007/s11092-013-9165-y

Kurniasari, I. D., & Rahmawati, D. (2016). Pengaruh Minat Menjadi Guru dan Praktik Pengalaman Lapangan (PPL) Terhadap Kesiapan Mengajar. *Jurnal Kajian Pendidikan Akuntansi Indonesia*, *5*(2), 1–14. http://journal.student.uny.ac.id/ojs/index.php/kpai/article/view/5680

López-Vargas, O., Duarte-Suárez, L., & Ibáñez-Ibáñez, J. (2017). Teacher's computer self-efficacy and its relationship with cognitive style and TPACK. *Improving Schools*, *20*(3), 264–277. https://doi.org/10.1177/1365480217704263

Nazari, N., Nafissi, Z., Estaji, M., & Marandi, S. S. (2019). Evaluating novice and experienced EFL teachers' perceived TPACK for their professional development. *Cogent Education*, *6*(1), 1632010. https://doi.org/10.1080/2331186X.2019.1632010

Pan, X. (2020). Technology Acceptance, Technological Self-Efficacy, and Attitude Toward Technology-Based Self-Directed Learning: Learning Motivation as a Mediator. *Frontiers in Psychology*, *11*, 1–11. https://doi.org/10.3389/fpsyg.2020.564294

Roisah, B., & Margunani. (2018). Pengaruh Minat Menjadi Guru, Penguasaan MKDK, Dan PPL Terhadap Kesiapan Mahasiswa Menjadi Guru. *Economic Education Analysis Journal*, *8*(1),

18–23. http://journal.unnes.ac.id/sju/index.php/eeaj

Ross, S. M. (2014). *Introduction to Probability and Statistics for Engineers And Scientists*. Elsevier.

Rosyid, A. (2015). Tecnological Pedagogical Content Knowledge: Sebuah Kerangka Pengetahuan Bagi Guru Indonesia di Era MEA. *Prosiding Seminar Nasional Inovasi Pendidikan*, 446–454. https://jurnal.fkip.uns.ac.id/index.php/snip/article/viewFile/8962/6523

Saudelli, M. G., & Ciampa, K. (2016). Exploring the role of TPACK and teacher self-efficacy: an ethnographic case study of three iPad language arts classes. *Technology, Pedagogy and Education*, *25*(2), 227–247. https://doi.org/10.1080/1475939X.2014.979865

Schiefele, U., & Schaffner, E. (2015). Teacher interests, mastery goals, and self-efficacy as predictors of instructional practices and student motivation. *Contemporary Educational Psychology*, *42*, 159–171. https://doi.org/10.1016/j.cedpsych.2015.06.005

Sidik, R., Mulyadi, H., & Sumartini, S. (2022). Efek Mediasi Efikasi Diri Komputer pada Pengaruh Daya Dukung Sekolah terhadap Kompetensi Teknologi, Pedagogi, dan Konten Guru Ekonomi. *SAP (Susunan Artikel Pendidikan)*, *7*(1), 59–67. https://doi.org/10.30998/sap.v7i1.12931

Sugiyono. (2019). *Metode Penelitian Pendidikan*. CV. Alfabeta.

Suryani, S., & Hendriyadi, H. (2015). *Metode Riset Kuantitatif: Teori dan Aplikasi pada Penelitian Bidang Manajemen dan Ekonomi Islam*. Prenada Media Group.

Suyamto, J., Masykuri, M., & Sarwanto, S. (2020). Analisis Kemampuan Tpack (Technolgical, Pedagogical, and Content, Knowledge) Guru Biologi Sma Dalam Menyusun Perangkat Pembelajaran Materi Sistem Peredaran Darah. *INKUIRI: Jurnal Pendidikan IPA*, *9*(1), 44–53. https://doi.org/10.20961/inkuiri.v9i1.41381

Syofyan, R., Hidayati, N. S., & Sofya, R. (2020). Pengaruh Program Pengalaman Lapangan Kependidikan (PLK) dan Efikasi Diri terhadap Minat Menjadi Guru. *Jurnal Inovasi Pendidikan Ekonomi (JIPE)*, *10*(2), 151–162. https://doi.org/10.24036/011103600

Ulfah, M., & Erlina. (2022). Analisis Kemampuan Technological Pedagogical Content Knowledge (TPACK) dalam Pembelajaran Daring pada Calon Guru Kimia. *JIPI (Jurnal IPA Dan Pembelajaran IPA)*, *6*(3), 273–286. https://doi.org/10.24815/jipi.v6i3.26572

Wang, Y., & Zeng, Y. (2022). Multisensory Concept Learning Framework Based on Spiking Neural Networks. *Frontiers in Systems Neuroscience*, *16*, 845177. https://doi.org/10.3389/fnsys.2022.845177

Wati, I., Hasan, M., Ihsan said, M., & Inanna, H. (2022). Pengaruh Minat Menjadi Guru Dan Praktik Pengalaman Lapangan Terhadap Kesiapan Mengajar Calon Guru Program Studi Pendidikan Ekonomi. *Jurnal Eduscience*, *9*(3), 635–649. https://doi.org/10.36987/jes.v9i3.3311

Weeks, K. J., Lawver, R. G., Sorensen, T. J., & Warnick, B. K. (2020). Do Teachers Have the Skills: 21st Century Skills in the Agricultural Education Classroom? *Journal of Agricultural Education*, *61*(4), 127–142. https://doi.org/10.5032/jae.2020.04127

Zeng, Y., Wang, Y., & Li, S. (2022). The relationship between teachers' information technology integration self-efficacy and TPACK: A meta-analysis. *Frontiers in Psychology*, *13*, 1–13. https://doi.org/10.3389/fpsyg.2022.1091017