

Teachers' Performance in Integrating Technology in The Digital Era Through Professional Competence and Self-Efficacy

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Abstrak:

This study is to ascertain the impact of teachers in MIN 1 Malang City regarding technology professional knowledge, self-efficacy, and the efficacy of technology integration performance. It also seeks to ascertain the relationship between these variables. This study employs a quantitative methodology within the framework of a descriptive-explanatory research design. Based on teaching experience spanning more than five years, 103 teachers, or 45.5% of the total population, comprise the samples, as determined by the sample calculation using the Slovin formula. A questionnaire with a measurement scale ranging from 1 to 5 was the instrument utilized. Descriptive statistical analysis and structural equation modeling (SEM) were used as data analysis methodologies. Teacher Technology Professional Knowledge, Teacher Self-Efficacy, and Technology Integration Performance of MIN 1 Malang City Teachers meet high criteria with a PPT value of 3.87 (77.4%), EF of 3.54 (70.8%), and KIT of 3.53 (70.6%). The dimension of technology content knowledge, the dimension of confidence for students, and the dimension of ICT confidence have the greatest influence on each variable by providing the highest value on its indicators. There is an influence of technology professional knowledge on technology integration performance in learning through teacher self-efficacy in MIN 1 Malang City. It can be said that the higher the professional knowledge of technology and teacher self-efficacy, the more effective integrating technology is.

Keywords

Self-efficacy; Technology Integration Performance; Technology Professional knowledge

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Introduction

The rapid development of technology has affected all dimensions of life, especially education. The expectation of today's teachers is that they will integrate technology in a constructive and productive way into the classroom ([Durff & Carter, 2019](#)). Technology integration can benefit student learning processes and performance when teachers implement it effectively in the classroom ([Dong et al., 2020](#)). On the other hand, it can create additional workload, challenges, and stress for teachers. Teachers continue to struggle with the time available to keep up with emerging technologies and with related innovations in pedagogy ([Andyani et al., 2020](#)). In addition, teachers usually see technology as a tool for lesson preparation, knowledge delivery, or engaging students, but they lack adequate skills and competencies in designing and implementing constructive use of technology in the teaching and learning process ([Hsu & Chen, 2018](#); [Sen & Durak, 2022](#)). There are consistent reminders for teachers to continuously improve their knowledge and skills to more effectively integrate new technologies into their teaching ([Kimmons et al., 2020](#)). Therefore, technology can also be implemented in a way that does not overwhelm or frustrate teachers by modifying their pedagogy to integrating technology. To date, a number of researchers have focused on technology integration to explain the complex transformation that contemporary educators have to face ([Ananda et al., 2022](#); [Chieng & Tan, 2021](#); [Luo et al., 2022](#)).

Teachers' technology professional knowledge is an integration of teaching, content, and technology, better known as Technology Pedagogy and Content Knowledge (TPACK), as first used by [Taimalu & Luik, \(2019\)](#); [Sholeh et al., 2022](#)). TPACK is an area of expertise that teachers need in this 21st-century learning environment. [Castéra et al., \(2020\)](#) revealed that TPACK is an important integration between TPK, PCK, and TCK that has a great impact on the current learning organization. TPACK is closely related to the realization of teachers' need to understand how to use technology in a constructive way to present teaching materials and deliver instructional content ([Hsu & Chen, 2018](#)).

Teacher-owned TPACK research produces ever-evolving findings and impacts the diversity of TPACK identification. Such research includes: 1) the nature of the relationship between TPACK components ([Li et al., 2019](#)). Teacher abilities or characteristics that may influence TPACK ([Aniah, 2019](#)). 3) TPACK research based on the level of education provision, such as in pre-service teachers ([Birisci & Kul, 2019](#); [Sulistiani et al., 2023](#)), kindergarten and elementary school teachers ([Dewi, 2021](#)), as well as senior secondary to higher education teachers ([Abukishk & Alkhasawneh, 2020](#); [Paetsch & Drechsel, 2021](#)). The success of ICT integration in the classroom depends not only on the teacher's lesson design but also on individual aspects of the teacher, such as teacher ability, beliefs, perceptions, self-efficacy, independence, and many other factors that influence decisions about what, when, and how to teach using technology ([Ottenbreit-Leftwich et al., 2018](#)).

Self-efficacy is a manifestation of teacher knowledge in the sense of a belief in being able to teach and motivate students to succeed in achieving learning goals. ([Kurt & Tomak, 2022](#)). Teachers who possess high self-efficacy have the ability to bring about changes in student achievement ([Guo et al., 2011](#)). Supporting the research findings, teachers who have high self-efficacy tend to believe they have the required skills to use learning technology in the classroom ([Paetsch & Drechsel, 2021](#); [Priyanti et al., 2019](#)). [Ottenbreit-Leftwich et al., \(2018\)](#) also revealed that self-efficacy is a belief that strongly supports the achievement of the effectiveness of technology integration in learning.

In fact, there are still many teachers who want to realize the effectiveness of technology integration performance, but they forget about technological knowledge and self-efficacy in the process of using technology in learning ([Li et al., 2019](#)).

Another interesting point is that [Tondeur et al., \(2017\)](#) revealed that self-efficacy, perceived ease of use, and TPACK have different relationships when associated with teacher profiles or backgrounds. In line with these findings, [Atman Uslu & Usluel, \(2019\)](#) recommended future research consider self-efficacy and other affective factors in research related to TPACK and technology application in learning.

[Abukishk & Alkhasawneh, \(2020\)](#) revealed that TPACK is one of the determinants of the effectiveness of technology integration in the form of a technology knowledge model centered on teacher pedagogy. The TPACK framework is a description of teacher knowledge of the effectiveness of technology integration [\(Tondeur et al., 2019\)](#). Some of these findings become one of the reasons to conduct further research with different research subjects, learning content, and learning conditions from previous studies.

Technology integration performance emerged as a variable related to technology professional knowledge and self-efficacy. Technology integration performance is the use of technology by teachers regularly and clearly to supporting each learning objective [\(Andyani et al., 2020\)](#). [Farjon et al., \(2019\)](#) revealed that the effectiveness of technology integration performance highly depends on teachers' commitment and understanding of the application of technology in learning. This is certainly one of the primary needs in learning, which aims to make students able to survive in every changing era. In realising this goal, the effectiveness of technology integration performance is not only a picture of technology but also how technology can focus on supporting curriculum delivery and learning [\(Zhou et al., 2021\)](#).

[Luo et al., \(2022\)](#) revealed that it is crucial to provide insights through research on how to help basic education educators to integrate technology in pedagogical and content knowledge in learning. There are many studies that examine the relationship between the variables of technology professional knowledge, self-efficacy, and technology integration performance. However, there is still no research that measures the relationship between the three variables with madrasah ibtidaiyah (MI) teacher as the subject. This study seeks to fill the research gap, namely examining individual characteristics such as technology professional knowledge, self-efficacy, and technology integration performance of madrasah ibtidaiyah teachers, and analyzing the relationship between the three variables.

Research Method

This study uses quantitative research to examine the correlation between technology professional knowledge, teacher self-efficacy, and technology integration performance in classroom learning. The population in this study was all madrasah ibtidaiyah teachers within the ministry of religion of Malang city. One hundred and five teachers were involved in this study. Sampling in this study uses the characteristics of existing research subjects. This is in accordance with the results of previous research integration performance research that in technology integration research teachers can consider the demographics of research subjects that affect the understanding and performance of technology [\(Andyani et al., 2020; Sulistiani et al., 2023\)](#). Characteristics of research subjects based on gender with 39 male participants or 37.8% and 64 female participants or 62.2%. Based on the level of education, the number of teachers with S1 education was 54 teachers or 52.4% and the number of teachers with S2 education was 49 teachers or 47.6%. Based on their age, the number of teachers aged less than 30 years was 10 teachers or 9.7%, aged 31-35 years was 41 teachers or 39.8%, aged 36-40 years was 38 teachers or 16.9%, and aged above 40 years was 15 teachers or 13.6%. Based on their expertise, 60 teachers or 58.3% are class teachers, 25 teachers or 24.3% are subject teachers, and 18 teachers or 17.4% are qur'an recitation teachers.

Table 1. Respondent Demographics

Variable	Category	Amount	Percentage
Gender	Male	39	37,8%
	Female	64	62,2%
Education	S1	54	52,4%
	S2	49	47,6%
Age	< 30 years old	10	9,7%
	31 - 35 years old	41	39,8%
	36 - 40 years old	38	36,9%
	> 40 years old	14	13,6%
Expertise	Class teachers	60	58,3%
	Subject teachers	25	24,3%
	qur'an recitation teachers	18	17,4%

Three surveys used in this study are: Technology Professional Knowledge [Simsek & Yazar, \(2019\)](#) has 17 statement indicators; self-efficacy [Tondeur et al., \(2019\)](#) has 24 statement indicators, and teacher technology integration performance [Ling Koh et al., \(2014\)](#) has 33 statement indicators. The data collection technique in this study used a questionnaire. The data collection technique used in this study was a questionnaire. Questionnaires in this study were used to collect data on knowledge of technology professionalism, self-efficacy, and technology integration performance. The type of questionnaire used in this study is a closed questionnaire, where each statement has been provided with alternative answers so that the respondent can choose the option of the answer that has been provided. The criteria of the Likert scale consist of: strongly agree (SS) = score 5; agree (S) = score 4; doubt (R) = score 3; disagree (TS) = score 2; strongly disagree (STS) = score 1.

The analysis techniques in the study are divided into two categories: descriptive data analysis techniques and Structural Equation Model (SEM) analysis techniques. Descriptive statistical analysis techniques are used to analyze the data so that it can be presented in an informative and in-depth manner. Descriptive statistical analysis aims to identify and describe trends and variations in the population or describe samples in research aimed at identifying causal effects. Besides that, descriptive analysis plays an important role in the scientific process in general and educational research in particular. Descriptive statistical analysis in this study was carried out with the help of SPSS 24.

The second analysis, SEM analysis, was used with the aim of mapping the hypothesized model. Multivariate normality was checked using the AMOS statistical package (version 24), and maximum likelihood estimation was used to achieve an appropriate fit of the model. According to [Atman Uslu & Usluel, \(2019\)](#), the sample size to achieve likelihood estimation in SEM is around 100-200 which was fulfilled in this study. The alternative model (AM) is tested by comparing the chi-squared index () and degrees of freedom (df) to see if it can achieve a better model fit than the original model. Model fit indices such as minimum sample discrepancy (CMIN), Tucker-Lewis's index (TLI), comparative fit index (CFI), Goodness of Fit index (GFI), Adjusted Goodness of Fit index (AGFI), and root-mean-square error of approximation (RMSEA) were performed to check the model suitability in this study.

Before using the instrument, an instrument test will be carried out to obtain a valid and reliable instrument. To obtain valid and reliable data, the instrument was

previously tested for validity and reliability, as shown in Table 2. Based on Table 2, it can be explained that based on the results of the validity test analysis, it shows that the loading factor of all indicators is > 0.5 , so it can be said that all these items are valid. Based on Table 2, the Cronbach's alpha value is > 0.70 . This means that the questionnaire instrument items are declared reliable. Assessment indicators for research instruments with data collection through surveys are presented in Table 2.

Table 2. Instrument Validity Test Results

No	Variable	Indikator	Item	Validitas	Reliability
1	Technology Professional Knowledge (Chai et al., 2013)	Technological Knowledge (TK)	TK1	0.966	0.902
			TK2	0.945	
			TK3	0.718	
			TK4	0.935	
		Technological Pedagogical Knowledge (TPK)	TPK1	0.896	0.874
			TPK2	0.605	
			TPK3	0.601	
			TPK4	0.947	
		Technological Content Knowledge (TCK)	TCK1	0.699	0.923
			TCK2	0.807	
			TCK3	0.692	
			TCK4	0.849	
		Technological Pedagogical Content Knowledge (TPCK)	TPCK1	0.613	0.763
			TPCK2	0.944	
			TPCK3	0.657	
			TPCK4	0.536	
2	Self-efficacy (King, 2017)	Efficacy for instructional strategies (EIS)	EFIS1	0.878	0.874
			EFIS2	0.857	
			EFIS3	0.827	
			EFIS4	0.836	
			EFIS5	0.802	
			EFIS6	0.746	
			EFIS7	0.908	
			EFIS8	0.847	
		Efficacy for classroom management (ECM)	EFCM1	0.737	0.881
			EFCM2	0.774	
			EFCM3	0.734	
			EFCM4	0.753	
			EFCM5	0.855	
			EFCM6	0.803	
			EFCM7	0.748	
			EFCM8	0.705	
		Efficacy for student engagement (ESE)	EFSE1	0.918	0.916
			EFSE2	0.549	
			EFSE3	0.861	
			EFSE4	0.905	
			EFSE5	0.942	
			EFSE6	0.836	
			EFSE7	0.804	
			EFSE8	0.932	
4	Technology Integration Performanc	Attitude toward ICT (ATI)	ATT1	0.536	0.904
			ATT2	0.672	
			ATT3	0.677	
			ATT4	0.69	

e (Aslan & Zhu, 2017)		ATT5	0.857	
		ATT6	0.666	
		ATT7	0.976	
		ATT8	0.962	
		ATT9	0.969	
		ATT10	0.71	
ICT experience (ICE)		TE1	0.918	0.869
		TE2	0.549	
		TE3	0.861	
		TE4	0.905	
		TE5	0.942	
		TE6	0.979	
		TE7	0.897	
		TE8	0.966	
		TE9	0.883	
		TE10	0.986	
ICT Self-confidence (ISC)		TC1	0.727	0.864
		TC2	0.936	
		TC3	0.932	
		TC4	0.969	
		TC5	0.699	
		TC6	0.621	
		TC7	0.517	
		TC8	0.519	
School Climate and Support (CSC)		IS1	0.739	0.883
		IS2	0.81	
		IS3	0.508	
		IS4	0.889	
		IS5	0.598	

Results and Discussion

Technology Professional Knowledge

Teachers' competence in integrating technology into classroom learning is known as technology professional knowledge. Technology professional knowledge (TPCK) has three component dimensions, which include technological knowledge (TK), technological pedagogy knowledge (TPK), and technological content knowledge (TCK). The TPCK component consists of 3 dimensions, where each dimension consists of 4–5 statement indicators, with the total number of TPCK indicators being 17 statement indicators. Figure 1 presents the values relevant to the teacher's technology professional knowledge.

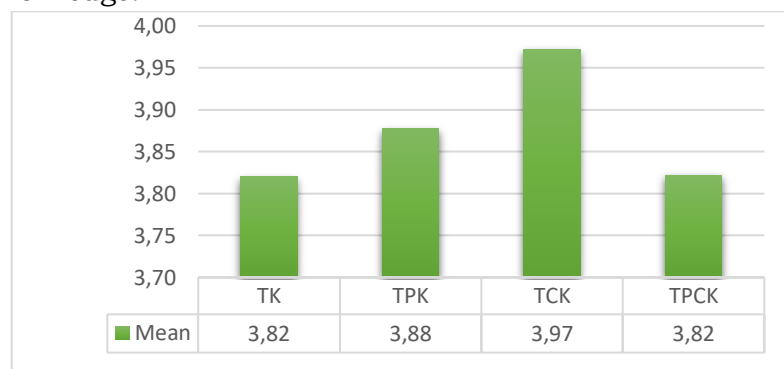


Figure 1. Technology Professional Knowledge Results

The TK dimension score is 3.82, the TPK dimension score is 3.88, the TCK dimension score is 3.97, and the TPCK dimension score is 3.82. Based on the scores obtained on the value of technology professional knowledge, it is found that the TPK dimension has the highest value. This shows that the TCK owned by respondents has the greatest influence when compared to other indicators of technology professional knowledge. The average score of the technology professional knowledge variable is 3.87, equivalent to 77.4% of the respondents' technology professional knowledge scale that appears. Thus, the level of technological professional knowledge of MIN 1 teachers is categorized as high.

The results of this study indicate that the higher a teacher's technology content knowledge, the higher his or her technology professional knowledge. This finding certainly supports some previous research. [Yang et al., \(2021\)](#) in their research, found that developing teachers' technological knowledge competencies made a major contribution to teachers' intention to use technology. The same result was also shown by [Hsu & Chen, \(2018\)](#); [Sholeh et al., \(2022\)](#) teacher technology professional knowledge is closely correlated with the realization of teacher integration performance regarding how to use technology content in a constructive way to deliver learning content. also revealed that technology content knowledge is an important component in representing technological competence.

Self-efficacy

Self-efficacy is a teacher's belief in being able to teach and motivate students well. The dimensions of self-efficacy consist of efficacy for classroom management (ECM), efficacy to promote student engagement (SE); and efficacy in using instructional strategies (IS). The self-efficacy instrument consists of 3 dimensions divided into 24 indicators (statements). The values relevant to the level of teacher self-efficacy are presented in Figure 2.

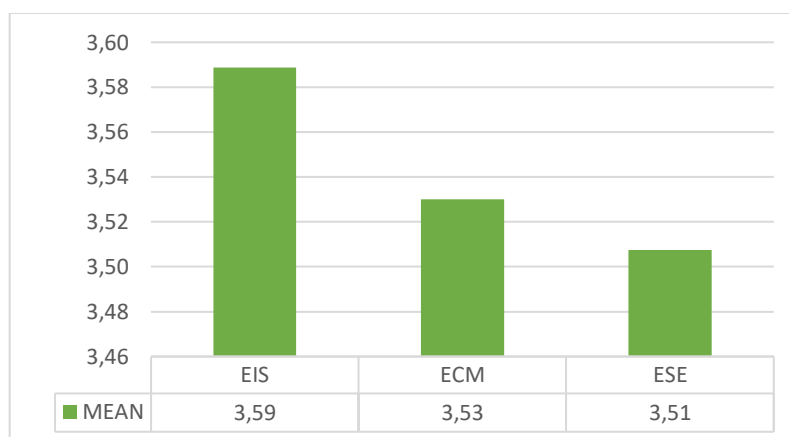


Figure 2. Self-efficacy results

Based on the results of the self-efficacy analysis, it was found that the EIS dimension has an average score of 3.59, the ECM dimension has an average score of 3.53, and the ESE dimension has an average value of 3.51. This shows that the indicators of the effectiveness in using instructional strategies (EIS) dimension have the greatest influence when compared to other indicators that make up the SE

variable. The average value of the SE variable is 3.54, which is equivalent to 70.8% of the self-efficacy scale that occurred. So, the SE level of MIN 1 Malang City teachers is interpreted in the high category. This is in accordance with the research of [Andyani et al., \(2020\)](#), who found that self-efficacy is strongly influenced by confidence in using learning strategies in the classroom. The better the teacher implements learning strategies, the more the teacher's self-efficacy increases ([Ottenbreit-Leftwich et al., 2018](#)).

Performance of Technology Integration

Measurement of technology integration performance variables is conducted using 4 dimensions including Attitude toward ICT (ATI), ICT experience (ICE), ICT Self-confidence (ISC), and School Climate and Support (CSC). The ATI dimension consists of 10 statement indicators, the ICE dimension consists of 10 statement indicators, the ISC dimension consists of 8 statement indicators, and the SCS dimension consists of 5 statements. The total IIE indicators are 33 statement indicators. The results of the technology integration performance assessment are presented in Figure 3.

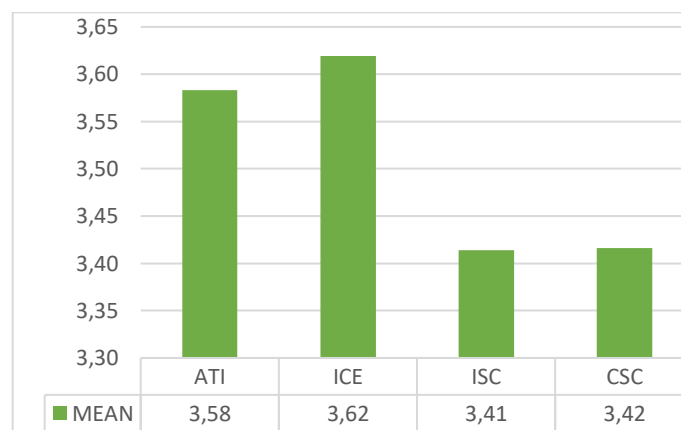


Figure 3. Technology Integration Performance Results

Based on Figure 3 above, the dimension with the highest average value is ICE, which is 3.62, ATI is 3.58, CSC is 3.42, and the last is ISC, which is 3.41. This shows that indicators from the ICT Self Confidence (ISC) dimension have the greatest influence when compared to indicators from other dimensions that make up the IP variable. The average value of the KI variable is 3.53, equivalent to 70.6% of the KI scale that occurred. So, the level of KI of MIN 1 teachers in Malang City is interpreted as being in the high category. The results of this study are in accordance with the results of research conducted, which found that experience in using technology is one of the important factors for integrating the technology. Teachers who have gained a lot of experience dealing with technology are one of the indicators related to the performance of technology integration ([Raphael & Mtebe, 2017](#)). In addition, [Ottenbreit-Leftwich et al., \(2018\)](#) revealed that the effectiveness of technology integration in learning should pay attention to the qualification factors and technological experiences that teachers have been through.

Full Model Analysis of Structural Equation Modeling

Full model structural equation modeling (SEM) analysis is carried out after the level of unidimensionality of dimensions and indicators forming latent variables or exogenous and endogenous constructs tested by confirmatory factor analysis. Analysis of data processing results on the full model is carried out by conducting compatibility tests and statistical tests. Figure 4 shows that in the SEM full model testing diagram, there is no model identification problem. Thus, it can be continued to test the significance of dimensions and indicators measuring constructs and the validity of constructs. The following are the results of data analysis using AMOS 24.00. Based on the results of the data analysis through AMOS 24.00 on regression weights in full model SEM, all dimensions have a C.R. value ≥ 1.96 or a P value ≤ 0.05 . While the indicators are all valid because they have a standard factor loading of ≥ 0.5 , furthermore, it will continue with the feasibility test of the full SEM model.

The results of the confirmatory factor analysis full SEM model feasibility test are as follows:

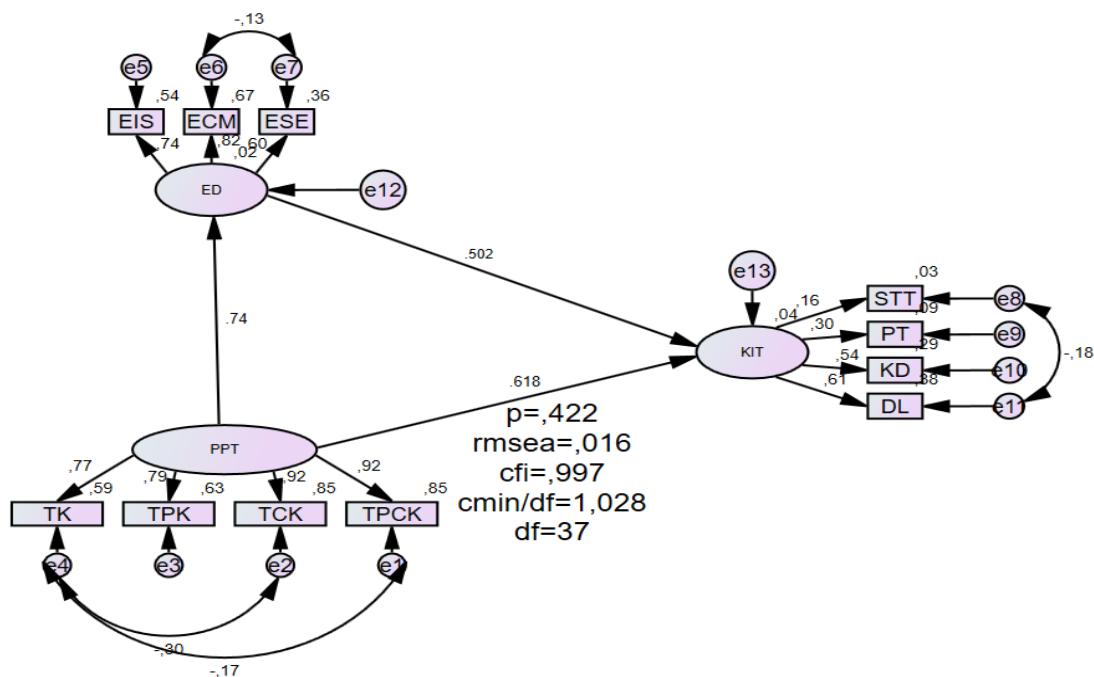


Figure 4. Full model test results

Table 3. Shows that the SEM full model has a good goodness of fit. The probability value of chi-square > 0.05 , namely 0.442 and the values of TLI, CFI, chi-square, GFI and RMSEA have met the recommended values even though the AGFI value is still in the marginal fit category, it is acceptable. [Joseph F. Hair, William C. Black, Barry J. Babin, \(2009\)](#) state that goodness of fit (GOF) can be assessed based on a minimum of 4-5 criteria which are considered sufficient to assess the feasibility of a model as a whole SEM full models are fit models of acceptable constructs.

Table 3. SEM Full Model Eligibility Test

Godness of Fit Indeks	Cut-off Value	Hasil Analisis	Evaluasi Model
Chi-Square (df = 126)	2.726	1.028	good fit
Probability	≥ 0.05	0.422	good fit
RMSEA	≤ 0.08	0.016	good fit
GFI	≥ 0.90	0.937	Good fit
AGFI	≥ 0.90	0.888	marginal fit
TLI	≥ 0.95	0.996	good fit
CFI	≥ 0.95	0.997	good fit

The fundamental hypothesis of SEM analysis in this study is accepted, which means that there is no significant difference between the data covariance matrix of the data variables of the observed variables and the covariance matrix of the specified model. This shows that the three structural equations generated by the fit model (full model) in the study can be used to explain the relationship and influence between independent variables on the dependent variable. Statistical testing will be carried out so that it can be seen which independent variables have a significant and most dominant effect on the dependent variable.

Research Hypothesis Testing

Hypothesis testing is carried out on the three hypotheses proposed. Hypothesis testing is judged by the t-value (critical ratio) with a significance level of 0.05. The t-value in the AMOS 24.00 output results is the C.R. value on the regression weights of the fit model (full model). If the C.R. value is ≥ 1.967 or the probability value is $p \leq 0.05$, then H_0 is rejected (the research hypothesis is accepted). The results of the AMOS 24.00 regression weight measurement value of the full model appear in the following table.

Table 4. Regression Weight Full Model Hypotesis

	Estimate	S.E.	C.R.	P
ED <--- PPT	5.412	1.211	4.469	,028
KIT <--- ED	3.747	0.878	4.27	,035
KIT <--- PPT	5.191	1.175	4.419	,042

Table 4. shows that the parameter estimate value of the relationship between professional knowledge of technology and self-efficacy is 5.412. Testing the relationship between the two variables shows that the C.R. value is 4.469 with a probability of 0.028 ($p < 0.05$). So, it can be concluded that professional knowledge of

technology has a positive and significant effect on the self-efficacy of MIN 1 Malang City teachers, so that the higher the teacher's professional knowledge of technology, the higher the teacher's self-efficacy beliefs will be. Therefore, hypothesis 1 is accepted because there is a positive correlation between PPT and ED among MIN 1 Malang City teachers.

Table 4. states that the parameter estimate value of the relationship between self-efficacy beliefs and integration performance 3.747. Testing the relationship between the two variables shows that the C.R. value is 4.27 with a probability of 0.035 ($p < 0.05$). So, it can be concluded that teachers' self-efficacy beliefs have a positive and significant effect on the integration performance of MIN 1 Malang City teachers, so that the higher the teacher's self-efficacy beliefs, the higher the teacher's integration performance will be. Accordingly, hypothesis 1 is accepted because there is a positive correlation between ED and KI among MIN 1 Malang City teachers.

Table 4 indicates that the parameter estimate value of the relationship between professional knowledge of technology and integration performance is 5.191. Testing the relationship between the two variables shows that the value of C.R. is 4.419 with a probability of 0.042 ($p < 0.05$). So, it can be concluded that the teacher's technological professional knowledge has a positive and significant effect on the integration performance of MIN 1 Malang City teachers, so that the higher the teacher's technological professional knowledge, the higher the teacher's integration performance. Thus, hypothesis 1 is accepted because there is a positive correlation between PPT and KI among MIN 1 Malang City teachers.

The analysis of hypothesis 1 testing reveals that TPACK competence has a positive and significant influence on the self-efficacy of public madrasah ibtidaiyah 1 teacher in Malang city. This can be seen in the results of obtaining a critical ratio (C.R) value of 4.469 with a probability of 0.028 ($P < 0.05$), which proves that the first hypothesis is accepted. The results of this study support research by [Durak, \(2021\)](#); [Keser et al., \(2015\)](#); [Cengiz, \(2014\)](#), which reported that teachers' technology professional competence has an important role in relation to technology integration beliefs in the classroom. Teachers tend to avoid using technology in the classroom due to low technology beliefs and competencies [\(Wang et al., 2004\)](#). The results of this study also support research conducted by [Abbitt, \(2011\)](#), which explored the relationship between TPACK and SE of teachers in early childhood education majors at the beginning and end of learning. The survey given to 45 teachers with different content knowledge (social studies, math, science, and literacy) had higher final scores compared to the initial test.

Based on the standardized regression weight, the ability and ease of use of technology indicators are the most influential technology integration indicators, with an estimated value of 0.433. On the other hand, the indicator that has the lowest influence value is technological competence, with an estimate value of 0.122. This means that pre-service Islamic education teacher students integrate technology into learning by looking at aspects of ease of use of technology and technological pedagogy skills but are not confident in their technological capabilities. These results support [Semiz & Ince, \(2012\)](#) research, which identifies two important factors in technology integration, including technology integration attitudes and ease of use of technology.

Meanwhile, in the self-efficacy variable, the indicator that has the highest effect of 0.803 is an indicator of the dimension of teacher confidence in the usefulness of technology. [Nathan, \(2009\)](#) and [Durak, \(2021\)](#) discovered that the beliefs of teachers who believe in the usefulness of technology will integrate technology into the classroom, which will have a positive impact on learning objectives. Other findings that support the results of this study include revealing that teachers' level of technology integration beliefs also positively affect their perceptions of technology integration in teaching. Teacher professional development programs are also one of the factors in increasing pre-service students' confidence to integrate technology, in addition to demographic factors such as gender and experience using technology.

Hypothesis testing conducted on the variables of technology professional knowledge (TPACK) and technology integration performance shows that the TPACK competence of pre-service Islamic education teacher students have a positive and significant effect on IIE, with a critical ratio (C.R.) value of 4.419 and a P (probability) of 0.042, which proves that this hypothesis is accepted. This means that TPACK contributes to the high rate of ICT integration among MIN 1 Malang City teachers. The higher the TPACK competence, the better the impact on the ICT integration of MIN 1 Malang City. In addition, the results of this study also support [Aslan & Zhu \(2017\)](#), who investigated the extent of ICT-related variables such as ICT competence, competence in ICT integration, attitude towards ICT, anxiety of using ICT, barriers in ICT integration, pedagogical knowledge, and previous experience in using ICT. The results of the ICT-TPACK knowledge research provide a significant influence on ICT integration.

Based on standardized regression weights, indicators related to ICT-related knowledge and competencies in the TPACK variable are in the high category. Indicators of technological knowledge related to ease of learning technology provide an estimate value of 0.906; indicators of technological pedagogical knowledge, namely indicators of facilitating technology integration, provide an estimate of 0.851; and indicators of technological content knowledge related to the use of software and the use of technology in learning provide an estimate value of 0.918. This means that pre-service Islamic education teacher students have very good ICT knowledge and competencies that affect the integration of ICT in their classrooms. ICT knowledge and competence are factors that influence the integration of ICT in learning ([Aslan & Zhu, 2017](#)).

The next variable is the performance of technology integration. Based on the standardized regression weight, the attitude towards ICT contributes an estimate of 0.199, the experience of using ICT contributes 0.185, confidence in using ICT contributes 0.849, and environmental climate factors contribute 0.97. These results illustrate that pre-service Islamic education teacher students consider confidence in using ICT and environmental factors to be the most dominant factors in influencing technology integration in classroom learning. The environmental climate factor is the indicator with the highest value, indicating that a conducive environmental climate will encourage pre-service teacher students to integrate technology into classroom learning. innovative environmental climate. An innovative environmental climate has a positive correlation with TPACK competence and supports behavior to create ICT integration in learning ([Andyani et al., 2020](#))

Hypothesis testing conducted on self-efficacy variables and technology integration performance shows that SE has a positive and significant influence on KIT with a critical ratio (C.R.) value of 4.270 and a P (probability) of 0.35, which proves that this hypothesis is accepted. This means that SE contributes to the high and low ICT integration of MIN 1 Malang City teachers. [Raphael & Mtebe \(2017\)](#) found that perceived ease of use of ICT has a positive relationship with integrating teacher ICT in the classroom. Perceived ease of use of ICT is one of the indicators of self-efficacy. Perceived ease of use of ICT has a favorable influence on the use of ICT in the classroom [\(Aslan & Zhu, 2017\)](#). Teachers' perceptions of ICT, ease of use of computer technology, and level of competence in using computers are proven to be related to teachers' technology integration self-efficacy.

The relationship between self-efficacy and ICT integration in education among pre-service teachers [\(Raphael & Mtebe, 2017\)](#) could be due to gender, experience using technology, and attitudes towards technology, which have been shown to be important factors related to perceptions of technology use and technology integration in learning. [Farjon et al., \(2019\)](#) have stated that the relationship between technology integration and the use of technological tools and media, skills, and attitudes towards technology can vary based on the current period and the work group. The contradictory findings reached in the study could be derived from the work group or related to time [\(Durak, 2021\)](#). This also explains the finding that there is no relationship between attitudes towards technology and technology integration self-efficacy, because in a world surrounded by technology, negative attitudes towards technology may not be an important issue anymore for teachers or pre-service teachers.

Based on the standardized regression weight, attitudes towards technology and experience using technology have the lowest influence on ICT integration in education. Attitude towards technology in standardized regression has an estimate value of 0.199, and experience using technology has an estimate value of 0.185 in standardized regression. This result indicates that these two dimensions have little effect on the technological integration of Islamic education teacher students. The distribution of the estimated results among pre-service Islamic education teacher students is one of the factors that influences whether there is an effect of technology integration self-efficacy on ICT integration in education. Although this is not the only factor related to the research findings, the analysis of the results of this study gives an effect on the relationship between the teacher's technology integration self-efficacy and ICT integration in education, which has an estimate value of 0.889, which is in the high category.

Conclusion

Teacher Technology Professional Knowledge, Teacher Self-Efficacy, and Teacher Technology Integration Performance of MIN 1 Malang City exhibits high criteria, with a TPACK value of 3.87 (77.4%), an EF of 3.54 (70.8%), and a KIT of 3.53 (70.6%). The technology content knowledge (TCK) dimension, the efficacy dimension for students, and the ICT self-confidence (ISC) dimension provide the greatest influence on each variable by providing the highest value on its indicators. At MIN 1 Malang City, teacher self-efficacy influences the performance of technology integration in learning. We can assert that increased professional knowledge of technology and teacher self-efficacy lead to more effective technology integration.

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