Ed Process Int J

www.edupij.com

ISSN 2147-0901 (Print), 2564-8020 (Online)

EDUCATIONAL PROCESS
INTERNATIONAL JOURNAL

The Effect of TPACK-Based Contextual Teaching and Learning Model on Student Learning Outcomes

Samsul Susilawati, Triyo Supriyatno, Ahmad Fatah Yasin, Abdulloh Chakim, Candra Avista Putri

Research Article

Cite this article: Susilawati, S., Supriyatno, T., Yasin, A. F., Chakim, A., & Putri, C. A. (2025). The Effect of TPACK-Based Contextual Teaching and Learning Model on Student Learning Outcomes. *Educational Process: International Journal, 16*, e2025279. https://doi.org/10.22521/edupij.2025.16.279

Received April 20, 2025
Accepted June 2, 2025
Published Online June 27, 2025

Keywords: TPACK, CTL, learning outcomes

Author for correspondence:
Samsul Susilawati
susilawati@pips.uin-malang.ac.id
Maulana Malik Ibrahim State Islamic University Malang, Indonesia

Abstract

Background/purpose. Social studies learning outcomes for fourth-grade pupils at Al-Hikmah Islamic Elementary School, Simpar Poncokusumo Malang, East Java, Indonesia, remain poor. Teachers' continued use of the traditional lecture technique and a single learning resource is the reason for the poor learning outcomes. Additionally, technology has not been used in the educational process. The researchers employed the Contextual Teaching and Learning (CTL) learning model to help these pupils perform better. Applying the Contextual Teaching and Learning (CTL) approach in conjunction with Technological Pedagogical Content Knowledge (TPACK) is the goal of this project.

Materials/methods. This study employed a nonequivalent control group design and a quasi-experimental research paradigm. Two groups participated in the study: one was taught using the TPACK-based CTL model as an experimental group, and the other was taught using traditional techniques. To ascertain the impact of the intervention on student learning outcomes, statistical tests were used to examine the data.

Results. The findings of the t-test performed by researchers utilizing the SPSS program provide evidence of this. According to the criteria for drawing conclusions, if the significance value is less than the significance level, then Ha is accepted and H0 is rejected in the cognitive learning outcomes, which had a significant value of 0.004 <0.05. The study's findings indicated that the TPACK-based CTL learning paradigm impacted class IV social studies learning outcomes.

Conclusion. It can be concluded that the TPACK-based CTL learning model has an effect on social studies cognitive learning outcomes in class IV. In CTL learning based on Technological Pedagogical Content Knowledge (TPACK), the teacher reaps many benefits: students can be creative and active, think critically, can follow the technology used by educators, learning is easier, can solve problems, and material can be understood by students well.

1. Introduction

The challenges of world development, especially in the implementation of learning, increasingly require the availability of reliable human resources in science and technology (Kirkwood & Price, 2014; Smaldino et al., 2012). Therefore, it must be accompanied by educational practices that are in accordance with all the demands of changing developments in educational technology to develop towards solving problems (Eliasson et al., 2023; Rashid & Asghar, 2016). The rapid development of technology also affects the potential of children. Some teachers today have not been able to grasp that what children have at their golden age is extraordinary potential. The lack of knowledge possessed by teachers is one of the causes of children's potential not developing (Kristian & Rahmat, 2018). Therefore, education from early childhood should not be neglected, and teachers who can understand the child's potential should be provided. The existence of a teacher in the world of education is one of the fundamental factors in the learning process. The quality of a teacher is a determinant of school quality both in terms of the learning process and in the quality of the output of graduates (Adamba, 2025; Erdem & Koçyiğit, 2025; Wani et al., 2025). As the main pillar in the education system, teachers must be able to coordinate their skills in developing technology-based learning.

Subjects in Social Sciences are categorized as one of the subjects that must be held at every level of formal education from the Islamic Elementary School level to tertiary institutions (Rohman et al., 2023). In this context, Madrasah Ibtidaiyah (MI) or Islamic Elementary School is considered the main foundation in the formation of students' intellectual values, integrity, nationalism, and morals. The application of social studies subjects has the main vision as social education, democracy which emphasizes values and moral education aimed at nation-building and character-building (Kuter & and Sanal-Erginel, 2025; Labraña et al., 2025). Therefore, character must be instilled early in Elementary School (Pratiwi et al., 2021). Instilling positive character in students is very important as a form of effort to prevent things that have a negative impact and needs to be implemented continuously (Iksal et al., 2024; Maharani & Ok, 2025). Children's acceptance of the material depends on how the teacher delivers and the class management. The role of the teacher is very important; in addition to being a role model in providing good moral examples, the teacher is also required to equip and develop attitudes and moral values for students, especially students in elementary school (Bélanger et al., 2012; Kurniawati et al., 2018; Paufler, 2018). The realization of these expectations depends on the success of teaching and learning activities in the classroom, which cannot take place without the teacher's role (Danniels & Pyle, 2023; Lloyd, 2009; Miedijensky et al., 2021). Law Number 14 of 2005 concerning Teachers and Lecturers Article 1 paragraph 1 stipulates that teachers are professional educators whose main task is to teach, guide, direct, train, assess, and evaluate (A. R. Fadillah et al., 2025). The way the teacher plans to deliver learning will have an impact on the achievement of student learning outcomes, which can be seen in changes in the knowledge, emotional, and attitude aspects of students (Adegboye & Oyiza Abubakar, 2021; Dredge et al., 2013). This results in the teacher knowing the strategies used in the subjects and the material to be delivered to get high learning outcomes. The reason is that learning outcomes are one aspect that determines the success of the learning process (Hunter & Botchwey, 2017; Tavangarian et al., 2004)

In reality, Islamic Elementary School teachers in Indonesia have not implemented contextual and technology-based learning models, games, applications, and other digital devices (Amin et al., 2025; Sunzuma & Umbara, 2025), as well as technological pedagogical and content knowledge (TPACK) in general (Aqib et al., 2025; Huang et al., 2025; Schmidt et al., 2009), including Islamic Elementary School teachers in Malang Regency. Referring to the results of the pre-research that the researchers conducted by interviewing the homeroom teacher of class IV Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia, it was found that most of the students scores did not meet the minimum completeness criteria with a minimum score of 78. The last daily assessment

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

was carried out on 11 students who achieved a completeness score of 22, especially in social studies subjects. This happened because the learning that took place involved more teachers who actively conveyed the material (teacher-centered), and teachers did not use strategies or learning methods that activate the role of students. Teachers use the lecture method more, using teacher handbooks and student books as a single learning resource. Learning like this makes students passive subjects who only accept what the teacher conveys. Students become easily bored, and in the end, what is conveyed by the teacher is not absorbed properly, or students easily forget the lessons they get at school. Such student responses affect their learning outcomes, especially on the affective and cognitive aspects. The level of students' ability to understand the meaning of the learning they get at school will affect the attitude that will be formed into a character. Meanwhile, character education is not education that is placed to stand alone, but education that is combined with other education, namely in social studies subjects. Therefore, in social studies, affective competence is related to cognitive competence, so efforts to improve learning outcomes must focus on and accommodate all aspects. To overcome this problem, the application of appropriate learning models is an alternative choice. The learning model in question is a type of learning model that relates learning material to real life, namely the Contextual Teaching and Learning (CTL) learning model.

So far, CTL research has been carried out in various countries as a form of effort to overcome less-than-optimal learning outcomes (Bitar & Davidovich, 2025; Glynn & Winter, 2004). These studies were conducted at various levels of education and subjects, proving the effectiveness of applying the CTL learning model to improve student learning outcomes. The CTL learning model aims to motivate students to understand the meaning of material in real-life contexts, so that they have knowledge or skills that can be applied in everyday life (Hyun et al., 2020). This learning model emphasizes full student participation to stimulate the brain in constructing the material being studied so that it is able to relate it in a real context (Glynn & Winter, 2004; Hyun et al., 2020). Students do not just listen and see to be able to understand and remember each material, but students put more emphasis on the learning process by carrying out activities to gain direct experience. This shows that contextual learning requires pedagogical strategies that are able to connect learning with real situations and student experiences. Therefore, it is important to use a framework like TPACK to integrate appropriate technology, pedagogy, and content in a balanced way to support contextual learning goals. The integration of TPACK and CTL is a logical and strategic step to strengthen the implementation of meaningful and relevant learning in the 21st century.

In addition to determining strategies in the learning process, the use of technology to support the learning process must also be considered. Given the rapid changes in school education with the emergence of digital systems that have an impact on teaching and learning practices. This fact reinforces the need to use digital media or other relevant media in the learning process because technological development is an unavoidable demand of the times (Gruszczynska et al., 2013). The learning process carried out at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia still rarely uses the help of learning technology. On this basis, the researcher attempted to examine the practice of integrating the CTL learning model with the TPACK approach in social studies subjects at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia. The TPACK approach is used to integrate technology into education (Oved & Alt, 2025). TPACK is an approach that combines technological knowledge, pedagogical knowledge, content knowledge, and content technology knowledge (Shiu, 2025). TPACK can also help students understand HOTS level learning (Susilawati et al., 2023). In the learning process, teachers need to pay attention to the type of technology that will be used when teaching, learning strategies and methods, as well as what material the teacher conveys. In their research, they proved that the CTL learning model had an effect on increasing students' motivation in reading. His research used a quasi-experimental model by comparing two study groups. The research sample used a random sampling

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

technique by comparing the two groups where the control class used conventional learning while the experimental class used the CTL learning model (Safira et al., 2025)

21st-century skills students need to succeed in careers during the information age. Like it or not, teachers have to adapt technology to learning activities (Panggabean et al., 2021). The TPACK approach can be integrated into several learning models by adjusting the needs of learning materials (Tseng et al., 2022). Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) are the three main components in the development of TPACK-based learning developed by Koehler and Mishra. The results of combining the three basic knowledge form 3 new knowledge, which include Pedagogical Content Knowledge, Technological Content Knowledge (TCK), and Technological Pedagogical Knowledge (TPK) (Yani et al., 2025). While learning outcomes are a form of increasing student competence after participating in a series of learning activities (Anggraeni & Riady, 2024). While learning outcomes are student learning experiences that include cognitive, affective, and psychomotor domains (Roh et al., 2025). Learning outcomes can be seen through evaluation activities as a form of evidence that shows students' abilities, either quantitative or qualitative. Several previous studies have not led to efforts to integrate the CTL learning model with the TPACK approach. Therefore, this study focuses on the integration of the CTL learning model with TPACK on student learning outcomes in cognitive and affective aspects at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia. Based on the above explanation, the problem in this research can be formulated as follows: How does the integration of the Contextual Teaching and Learning (CTL) model with the TPACK approach affect the cognitive and affective learning outcomes of students in social studies subjects?

Therefore, this research aims to analyze the effect of integrating CTL with TPACK on students' cognitive and affective learning outcomes. Its contribution is to provide empirical evidence and practical recommendations for teachers, especially in elementary schools, to adopt integrated learning strategies that are effective and relevant in the digital era.

2. Literature Review

A teaching strategy known as contextual teaching and learning (CTL) places an emphasis on how the material is related to actual experiences in students' everyday lives. CTL rejects the notion that students will learn more effectively if they actively create their knowledge by participating directly in pertinent contexts (Bender & Ko, 2024). This method strongly emphasizes six key elements: constructivism, inquiry, questioning, learning society, modeling, and reflection. Conversely, TPACK (Technological Pedagogical and Content Knowledge) is a conceptual framework that combines three crucial areas of teacher competency: technology (Technological Knowledge), pedagogy (Pedagogical Knowledge), and content competence) (Hidayat et al., 2024; Pazilah et al., 2024). In the context of 21st-century education, teachers' ability to combine these three domains is crucial to creating a learning process that is innovative, adaptive, and responsive to technological developments and students' learning needs.

Integrating contextual learning models with the TPACK approach creates potential synergies in designing learning that is meaningful, relevant, and engaging for students. With this approach, teachers deliver material in a context close to students' lives and utilize technology to strengthen understanding of concepts and increase learning engagement. Previous studies have shown that the application of TPACK in the learning process can improve teaching efficiency, strengthen interactivity, and help students build a deeper conceptual understanding (Yeh et al., 2021). Meanwhile, the implementation of CTL has been proven to increase learning motivation, active student participation, and critical thinking skills (Suwardika et al., 2024). Therefore, the TPACK-based contextual learning model is believed to be able to answer today's learning challenges that demand the integration of technology with a meaningful pedagogical approach.

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

This strategy has a favorable impact on student learning outcomes in a number of ways, including improved conceptual understanding, advanced thinking abilities, and the capacity to apply knowledge in practical settings. This aligns with the objectives of contemporary education, which prioritize emotive and psychomotor components in addition to cognitive ones. Numerous studies demonstrate that students who use a contextual, technology-based learning strategy perform better academically than those who use traditional learning methods (Ayanwale & Puseletso, 2025; Prasittichok et al., 2024). Thus, the study of the influence of TPACK-based contextual learning models on student learning outcomes is important and relevant to support the transformation of education that is oriented to the needs of students in the digital era.

The integration of the Contextual Teaching and Learning (CTL) approach and the Technological Pedagogical and Content Knowledge (TPACK) framework has been the subject of numerous studies. However, the literature's critical dimension indicates that there hasn't been much attention paid to the knowledge of context as a crucial component in TPACK implementation. Stress that the success of integrating technology into instruction is significantly impacted by classroom dynamics and students' sociocultural backgrounds. Therefore, TPACK cannot be understood in a vacuum (Porras-Hernández & Salinas-Amescua, 2025). This is emphasized by McDougall and Phillips (2024), who find that collaborative processes in teacher education need to be adjusted to the characteristics of the learning environment so that TPACK is truly internalized practically. Furthermore, Mishra (2019) suggests adding the Contextual Knowledge component to the TPACK model in order to update it to reflect the complexity of the increasingly varied learning environment.

Regretfully, the majority of earlier research is still generalist and hasn't specifically looked at how incorporating contextually-based TPACK learning models affects student learning results, especially in regional contexts like Indonesia (Suwadi et al., 2025) Using a thorough literature study, point out that one of the fundamental flaws in the evolution of TPACK theory to date has been the neglect of context as a field of knowledge. This study aims to fill this gap by empirically investigating how the TPACK-based CTL learning model affects student learning outcomes. This method not only effectively incorporates technology into learning activities but also harnesses the power of context-based education, which is relevant and near to students' lives. In this case, the research approach taken is different from the (Jiménez Sierra et al., 2023) study, which focuses more on teacher professional development through Lesson Studies rather than on direct implications on student learning outcomes. Thus, this study offers an original contribution by closing the literature gap related to the direct effects of the CTL-based TPACK model on students' academic achievement.

3. Methodology

This research was carried out at Al-Hikmah Islamic Elementary School Simpar, Poncokusumo District, Malang Regency. Before the implementation of the research, the researcher had obtained official permission from the school. This study uses a type of quantitative research with a quasi-experiment model (quasi-experiment), said to be pseudo because it uses the Nonequivalent Control Group Design design. (Anwar et al., 2023; Jelena & Jelena, 2022). The experimental group and the control group, which are not randomly assigned, are the two groups. The IVB group served as the control group and the IVA group as the experimental group. With 43 pupils in each class, this study was carried out at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang. Purposive sampling was employed to pick the sample, taking into account that there was no discernible difference in the students' sociodemographic backgrounds and that, according to the results of the prior daily exams, the academic ability of the two classes were about identical.

Participants in the implementation of learning interventions in grades IVA and IVB serve as the study's data sources. In order to collect data, two tools were used: (1) a multiple-choice test with 20

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

questions to gauge student learning outcomes; and (2) a tolerance observation sheet with 10 attitude assessment components that teachers use as observers during the learning process.

To ascertain if the experimental and control groups' outcomes differed, data were examined using a t-test or independent samples t-test. The Levene test was used to check the data for homogeneity of variance and the assumption of normalcy before the t-test was run. SPSS, a statistical program, was used to conduct the analysis. The hypothesis employed for the T-Test is:

a. The learning model substantially impacts student learning outcomes if the significance value (Sig. 2-tailed) is less than 0.05, rejecting H_o and accepting H_1.

b. The significance value (Sig. 2-tailed) is less than 0.05, then H_o is accepted and H_1 is rejected, indicating that the learning model has no discernible impact on student learning outcomes.

4. Results

4.1. Social Science Cognitive Learning Outcomes of Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang Students, East Java, Indonesia.

Based on the output of the pretest and posttest calculations in the experimental class and control class with a total of 43 students, a recapitulation of data is obtained which can be seen in Table 1 and Table 2.

Table 1. Recapitulation of Pretest Values

Frequency distribution	Pretest	
	Experiment	Control
Lowest Value	45	30
The highest score	95	95
Mean	69,32	77,50
Median	72,76	80,00
Standard Deviation	16,783	12,701

Table 2. Posttest Score Recapitulation

Frequency distribution	Posttest	
	Experiment	Control
Lowest Value	60	40
The highest score	95	95
Mean	65,95	66,43
Median	70,00	70,00
Standard Deviation	20,834	18,038

A pretest must be administered before any research action is taken to ascertain students' starting abilities prior to treatment. According to the data, there is a substantial difference between the experimental class's and the control class's average pretest scores. Pretest scores were 69.32 on average for the experimental class and 77.50 on average for the control class.

4.2. Affective Learning Outcomes of Social Sciences Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang East Java Indonesia.

According to the data collected, the study's findings indicated that using the TPACK-based CTL learning paradigm might enhance students' affective learning outcomes. In this instance, the experimental class's affective learning outcomes are more valuable than those of the control group. This finding is based on the results of the grade IV students' recapitulation, which included 43 students overall. Table 3 displays the outcomes of the recapitulation.

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

Table 3. Recapitulation of Affective Aspects

Frequency distribution	Class	
	Experiment	Control
Lowest Value	30	24
The highest score	38	38
Mean	34,68	31,29
Median	33,50	32,00
Standard Deviation	2,773	2,773 4,125

The findings of the learning outcomes recapitulation on the affective component are displayed in Table 3. With an average score of 34.68, a median of 33.50, and a standard deviation of 2.773, the experimental class received the lowest score of 30 and the maximum score of 38. In contrast, the control class had the lowest score of 24 and the highest score of 38, with an average of 31.29 and a standard deviation of 4.125. The two classes' values show that the experimental class's average value is greater than the control class's average value. This indicates that this study has demonstrated that using the TPACK-based CTL learning model can enhance students' affective learning results. The prerequisite test is carried out in at least 3 stages, namely, normality test, homogeneity test, and hypothesis testing. The detailed prerequisite test results are as follows:

1) Normality test

Since this study only included 50 samples, the Shapiro-Wilk test formula with a significance threshold of > 0.05 was employed for the normality test in SPSS. The pretest and posttest data on affective and cognitive learning outcomes are examined for normality using the normality test. Table 4 displays the findings of the normalcy test for the affective learning outcomes, and Table 5 displays the results for the cognitive learning outcomes.

Table 4. Test for Normality of Affective Learning Outcomes

	Class	Statistic	df	Sig	Conclusion
Learning Outcomes Student	Experiment	0,915	22	0,060	Normal
	Control	0,963	21	0,577	Normal

Table 4 shows that the significance level of the experimental post-test is 0.060, and the control post-test is 0.577. Thus, all data on affective assessment can be said to be normally distributed.

Table 5. Cognitive Learning Outcomes Normality Test

	Class	Statistic	df	Sig	Conclusion
Learning Outcomes student	Pretest Experiment	0,951	22	0,330	Normal
	Posttest Experiment	0,924	22	0,092	Normal
	Pretest Control	0,931	21	0,145	Normal
	Posttest Control	0,947	21	0,296	Normal

The data obtained according to Table 5 shows that the significance value of the experimental pretest was 0.330, the experimental posttest was 0.092, the control pretest was 0.145, the control posttest was 0.296. Thus all cognitive value data can be categorized as normally distributed.

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

2) Homogeneity Test

The homogeneity test has a significance level of 5% α = 0.05. The homogeneity test requires that the data be classified as homogeneous if the significant result is greater than 0.05. In the meantime, the data is not considered homogeneous if the significance value is less than 0.05. Table 6 displays the results of the homogeneity test in the emotive domain, whereas Table 7 displays the homogeneity test results in the cognitive domain.

Table 6. Test of Homogeneity of Affective Learning Outcomes

		Levene Statistic	df1	df2	Sig	Conclusion
Learning Outcomes Student	Based On Mean	3,2	1	41	0,072	Homogeneity

Table 6 shows that the significance value based on the mean on affective learning outcomes is 0.072, meaning that the significance value is > 0.05. Thus, it is concluded that the variance of the learning outcomes data from the two classes, experimental and control, is homogeneous.

Table 7. Homogeneity Test of Cognitive Learning Outcomes

		Levene Statistic	df1	df2	Sig	Conclusion
Learning Outcomes Student	Based On Mean	2,301	3	82	0,083	Homogeneity

Table 7 shows that the significance value based on the mean of cognitive learning outcomes is 0.083. This means that the significance value is > 0.05, so the conclusion is that the variance of the data on cognitive learning outcomes in the experimental and control classes is homogeneous.

3) Hypothesis Test: t-test

Analysis of hypothesis testing using t-test. This test aims to determine the effect of the TPACK-based CTL learning model on students. There are two ways of making decisions in this test: if the significance value > significance level (0.05), then Ha is rejected, and H0 is accepted; if the significance value < significance level (0.05), then Ha is accepted, and H0 is rejected. The results of the t-test in this study can be seen in Table 8 and Table 9.

Table 8. Hypothesis Results

		Significance	Conclusion
Learning outcomes	Class Experiment	0,049	Ha accepted
	Class Control	0,052	H0 rejected

According to Table 8, the experimental class's t-test results for the TPACK-based CTL learning model's hypothesis on affective learning outcomes had a significance of 0.049, which is below the significance level (0.049 <0.05). As a result, Ha is accepted, and H0 is rejected. Therefore, the TPACK-based CTL learning paradigm has an impact on students' social views, particularly in the area of tolerance. In contrast, Ha was rejected and H0 was accepted in the control group when the CTL learning model produced a significance value of 0.515, which is greater than the significance level (0.052 > 0.05). Thus, it can be said that the CTL learning approach has no effect on students' social attitudes toward tolerance.

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

Table 9. Test of the Cognitive Learning Outcomes Hypothesis

		Significance	Conclusion
Pair 1	Pretest Experiment Posttest Experiment	0,004	Ha accepted
Pair 2	Posttest Control Posttest Control	0,692	H0 accepted

The results of the Paired Sample t-test for the hypothesis of the TPACK-based CTL learning model on cognitive learning outcomes for the experimental class showed a significant value of 0.004, which is below the significance level (0.004 <0.05), as shown in Table 9. Consequently, H0 is rejected and Ha is accepted. Therefore, it can be concluded that the TPACK-based CTL learning paradigm influences students' cognitive learning outcomes. Despite the fact that the CTL learning model applied to the control group has a significance value of 0.692, which is higher than the significance requirement (0.692 > 0.05), Ha is rejected and H0 is accepted. Therefore, it may be concluded that the CTL learning model has no effect on students' cognitive learning outcomes.

5. Discussion

5.1. The Effect of TPACK-Based CTL Learning Model on Cognitive Learning Outcomes.

The experimental class pretest and posttest averages were 69.32 and 77.50, respectively. The pretest and posttest averages for the control group were 65.95 and 66.43, respectively. Learning outcomes increased on average for both classes' pretest and posttest scores; however, the experimental class's improvement in scores was more pronounced, with a percentage of 12% compared to 0.48% for the control class. This demonstrates that the TPACK-based CTL learning model is deemed effective and can raise student learning scores in the cognitive area by a large margin. It is known that the data is normally distributed with a significant value pretest experimental class 0.330 > 0.05, posttest experimental class 0.092 > 0.05, pretest control class 0.145 > 0.05, and posttest control class 0.296 > 0.05, based on the outcomes of processing the prerequisite test data on students' cognitive assessment using SPSS. With a significant value of 0.083, the data on variance in cognitive learning outcomes is said to be homogeneous. The TPACK-based CTL learning model used in the experimental class, on the other hand, is known to be accepted with a significance value of 0.004 <0.05 in the t-test, while the CTL learning model used in the control class is rejected with a significance value of 0.629>0.05. Thus, it can be said that the cognitive learning outcomes of fourth-grade students at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia, are impacted by the TPACK-based CTL learning paradigm. Therefore, these results corroborate Indrayadi's research, which demonstrates that CTL significantly influences reading motivation. (Indrayadi et al., 2020). These results are consistent with the findings that the CTL learning paradigm significantly improves social studies learning outcomes in elementary schools, more specifically in the context of PPkn subjects (Najib, 2023). Usage Of Contextual Teaching and Learning (CTL) Approach to Social Sciences Learning in Elementary School.

However, the study's findings also demonstrate that instructors' capacity to successfully integrate the three primary TPACK components, content knowledge, pedagogy, and technology, is crucial to the success of the TPACK-CTL model's deployment. These findings are in line with the study of (Suwadi et al., 2025) which emphasizes the importance of developing teachers' TPACK competencies, especially in the context of madrasas, to support the effectiveness of technology-based learning. A significant difference with (Usman et al., 2024) Research that solely employs CTL

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

without using technology demonstrates that incorporating TPACK into learning models adds value by enhancing learning outcomes, particularly in terms of students' cognitive development. This suggests that in the current digital world, technology is not only an essential part of contextual learning, but also a supplement to it. However, this study also identified a number of barriers that may prevent this learning model from being optimized, particularly those pertaining to teachers' technological proficiency and a lack of resources. These findings are also supported by research by McDougall & Phillips (2024) and Jiménez Sierra et al. (2023), which underscore the importance of teacher training and capacity building in order to optimize the use of technology in learning.

Furthermore, by highlighting the significance of the local context in the application of the TPACK-CTL model—specifically, by focusing on the needs and characteristics of students at Al-Hikmah Islamic Elementary School, a religion-based madrasah with distinctive student characteristics—this study closes the gap in the literature. In earlier studies that were more general and not focused on madrassas or elementary schools, this gap was sometimes overlooked. Thus, these results significantly add to the body of literature indicating that in order to make the CTL-based TPACK learning paradigm more successful and meaningful for students, its implementation needs to be contextually modified. The idea of Technological Pedagogical and Content Knowledge (TPACK) is explained as follows:

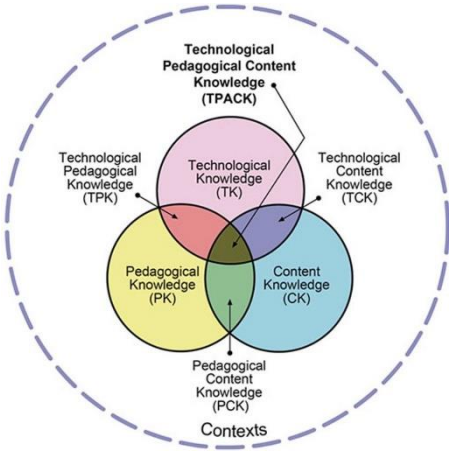

Figure 1. The TPACK concept

Technological Pedagogical and Content Knowledge (TPACK) is a teacher's insight on how to facilitate student learning assistance from certain content through pedagogic and technological approaches(Bautista et al., 2024)To support learning through technological assistance, prospective teachers must understand the technological content knowledge (TCK) theoretical framework, which is related to technological developments in learning and teacher professionalism. In order to use technology as a means of preparation for facing global challenges, prospective teachers must have a deep understanding of the elements of teacher competence that will enable them to improve their professionalism. TPACK learning can also provide benefits to generation Z to continue to be trained in improving literacy skills (Susilawati et al., 2021).

5.2. The Effect of TPACK-Based CTL Learning Model on Affective Learning Outcomes.

According to the data, the control class's average value was 31.29, whereas the experimental class's average value was 34.68. These average values demonstrate that the experimental class's affective learning outcomes using the TPACK-based CTL learning model were superior to those of the control group utilizing the same CTL learning model. The prerequisite test's SPSS-processed data indicates that the data is normally distributed, with a significance value of 0.060 > 0.05 for the experimental class posttest and 0.577 for the control class posttest. With a significance value of 0.251 > 0.05, the data on affective learning result variance is deemed homogenous. In the t-test it is known

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

that the TPACK-based CTL learning model applied to the experimental class is accepted with a significance value of 0.000 <0.05. Meanwhile, the CTL learning model applied to the control class was rejected with a significance value of 0.515 > 0.05. So, it can be concluded that the TPACK-based CTL learning model has an effect on the affective learning outcomes of PPKn students in grade IV Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia. Based on the description above, it can be concluded that the application of the CTL learning model with the TPACK approach has an important role in improving student learning outcomes, especially in social studies subjects. Thus, the application of the CTL learning model that is integrated with TPACK is one of the efforts that can be made to improve student learning outcomes at Al-Hikmah Islamic Elementary School Simpar Poncokusumo Malang, East Java, Indonesia. This is relevant to the results of Fadillah's research that the application of the CTL learning model can improve student learning outcomes(A. Fadillah et al., 2017). The role of technology, pedagogy, and learning materials in Al-Hikmah Islamic Elementary School can be combined with TPACK-based learning tools. TPACK-based tools were developed to solve problems related to learning in Al-Hikmah Islamic Elementary School. By integrating technology in the form of electronic-based infrastructure such as TV in the classroom. In CTL learning based on Technological Pedagogical Content Knowledge (TPACK), the teacher reaps many benefits: students can be creative and active, think critically, can follow the technology used by educators, learning is easier, can solve problems, and material can be understood by students well.

Table 10. Application of Learning with the TPACK Model for Social Sciences Teachers at Al-Hikmah Islamic Elementary School

No	Aspects of Engagement	TPACK Model Learning
1	Technology	Digital technology has been used, but it is still at a basic level, mastery is still simple, according to educators the important thing is that learning can take place.
2	Pedagogy	Still bound by rigid steps, mastery of pedagogical components and content has not been integrated.
3	Content mastery	Mastery of concepts, material delivered in the form of new practical theory, and material delivered using interactive PPT media has not yet developed critical thinking.
4	Learning model	Discovery learning, Contextual Teaching and Learning (CTL), problem-based learning, technology
5	Platforms used	Zoom, Google Meet, WAG, Google Classroom, Visits
6	Instructional Media	Interactive PPT, theory PPT, TikTok Videos, Fairy Tale videos
7	Constraint	Network/signal, quota, mastery of IT

Based on Table 10. Above that, in social studies learning activities, the important role of the teacher in the digital era, the TPACK framework must be able to be achieved by a teacher in learning activities by integrating the subject of technology knowledge, pedagogy, and content. Students are facilitated by educators by carrying out activities such as observing images, videos, or text. Based on the suitability with the characteristics of students as digital natives, the use of technology in the learning process is successful. In other words, students can benefit from the interaction between technology use and teaching. Another important element is the commitment and obedience of quality teachers in increasing their competence to keep abreast of developments in people's lives in an effort to design learning processes that are in line with the demands of students. The use of technology in social studies learning activities is effective because it is relevant to the characteristics

https://doi.org/10.22521/edupij.2025.16.279 Published online by Universitepark Press

of alpha generation children, especially digital natives who are more responsive to technology and can have a beneficial impact on students.

The initial contribution of this study is to affirm that the TPACK-based CTL model is not only effective in the cognitive domain, but also has a positive and significant impact on the affective domain, which has not been extensively researched in depth at the Al-Hikmah Islamic Elementary School level. This research also provides important practical implications, namely the need for sustainable teacher capacity development in order to optimize the integrated use of technology, pedagogy, and content in learning. Thus, this research supports adaptive learning transformation and is relevant to the characteristics of the current digital generation, especially in the context of basic education in madrasas.

6. Conclusion

The application of the Contextual Teaching and Learning (CTL) learning model integrated with the Technological Pedagogical Content Knowledge (TPACK) approach in social studies subjects at Al-Hikmah Islamic Elementary School Simpar Poncokusumo, Malang, East Java, Indonesia, has proven to be effective in improving student learning outcomes in both affective and cognitive aspects. Based on the results of research conducted on grade IV students through pretest and posttest evaluation, it was found that the use of the TPACK-based CTL model had a positive influence on student learning achievement. These findings show that the integration of technology, pedagogy, and learning content in TPACK teaching tools is able to answer learning challenges in Al-Hikmah Islamic Elementary School. The technology used, such as television media in the classroom, supports a contextual and interactive learning process. In the implementation of TPACK-based CTL, teachers get many benefits because students become more active, creative, critical, able to keep up with technological developments, easier to understand the material, and have better problem-solving skills. Thus, the TPACK-based CTL model is feasible to be applied as an alternative learning strategy in an effort to improve the quality of student learning outcomes as a whole, especially at the Al-Hikmah Islamic Elementary School level.

7. Suggestion

Based on the findings and research that has been conducted, it is recommended that further research not only focus on cognitive learning outcomes but also include affective and psychomotor aspects to get a more holistic picture of the influence of TPACK-based contextual learning models. In addition, it is necessary to conduct research at various levels of education not only at the elementary school level but can also be applied to universities and prospective educators as well as in other subjects to test the consistency of the effectiveness of this model in a broader context. With a more comprehensive approach, it is hoped that further research can make a more significant contribution to the development of innovative learning models that are relevant to the needs of 21st-century education.

Declarations

Author Contribution. (SS, TS: Literature review, conceptualization. SS, TS, AC, AFY: methodology, data analysis. CAP: review-editing and writing, original manuscript preparation. All authors have read and approved the published on the final version of the article

Conflicts of Interest. The author declares no conflict of interest.

Ethical Approval. The study was conducted with the approval of the Director of Postgraduate Maulana Malik Ibrahim State Islamic University Malang.

Data Availability Statement. Data can be shared on request only with the permission of the university that is the subject of the research.

References

Adamba, C. (2025). Teacher Credentials, Students' Efforts and Aspirations as Determinants of Learning Achievement in Mathematics and Science. *International Journal of Learning, Teaching and Educational Research*, *24*(1), 584–608. https://doi.org/https://doi.org/10.56724/ladu.v4i1.267

Adegboye, M., & oyiza Abubakar, H. (2021). Curriculum and Perceeption Towards Libarianship in Tai Solarin University of Education. *Library and Information Science*.

Amin, M. H. M., Razak, R. A., & Kamsin, A. (2025). Innovative Horizons: Design-Based Research (DBR) Transforming Education in Southeast Asia. In *Global Perspectives and Implementations of Design-Based Research* (pp. 31–64). IGI Global Scientific Publishing.

Anggraeni, D. R., & Riady, Y. (2024). Role of the School Library in Supporting the Teaching and Learning Process and Student Literacy at SDN Sawojajar 1. *LADU: Journal of Languages and Education*, *4*(1), 33–40. https://doi.org/10.56724/ladu.v4i1.267

Anwar, Y., Slamet, A., & Daniaty, U. (2023). Improving Critical Thinking Skills through Discovery Learning Models Assisted Animation Video on Digestive System Material. *Journal of Biological Education Indonesia (Jurnal Pendidikan Biologi Indonesia)*, *9*(3), 433–444. https://doi.org/https://doi.org/10.22219/jpbi.v8i3.2299

Aqib, M. A., Ekawati, R., & Khabibah, S. (2025). A modified technological pedagogical and content knowledge (TPACK) framework: A systematic literature review. *Multidisciplinary Reviews*, *8*(6), 167. https://doi.org/https://doi.org/10.31893/multirev.2025167

Ayanwale, M. A., & Puseletso, M. (2025). Cultural and technological Synergy: A new Pathway to learners success in development studies in Lesotho secondary schools. *Social Sciences & Humanities Open*, *11*, 101313. https://doi.org/https://doi.org/10.1016/j.ssaho.2025.101313

Bautista, A., Estrada, C., Jaravata, A. M., Mangaser, L. M., Narag, F., Soquila, R., & Asuncion, R. J. (2024). Preservice Teachers' Readiness Towards Integrating AI-Based Tools in Education: A TPACK Approach. *Educational Process: International Journal*, *13*(3), 40–68. https://doi.org/10.22521/edupij.2024.133.3

Bélanger, C. H., Leonard, V. M., & LeBrasseur, R. (2012). Moral Reasoning, Academic Dishonesty, and Business Students. *International Journal of Higher Education*, *1*(1), 72–89. https://doi.org/10.5430/ijhe.v1n1p72

Bender, E., & Ko, M. (2024). Dispatches from the Interface: Assessment Professionals in the CTL. *Transformative Dialogues: Teaching and Learning Journal*, *17*(3). https://doi.org/https://doi.org/10.26209/td2024vol17iss31831

Bitar, N., & Davidovich, N. (2025). From margin to center: positioning centers for teaching and learning as strategic partners in Israeli higher education. *Higher Education*. https://doi.org/10.1007/s10734-025-01450-y

Danniels, E., & Pyle, A. (2023). Inclusive play-based learning: Approaches from enacting kindergarten teachers. *Early Childhood Education Journal*, *51*(7), 1169–1179. https://doi.org/https://doi.org/10.1007/s10643-022-01369-4

Dredge, D., Pierre, B., Michele, D., Michael J., G., Maree, W., Paul, W., & and Whitelaw, P. A. (2013). Drivers of Change in Tourism, Hospitality, and Event Management Education: An Australian Perspective. *Journal of Hospitality & Tourism Education*, *25*(2), 89–102. https://doi.org/10.1080/10963758.2013.805091

Eliasson, S., Peterson, L., & Lantz-Andersson, A. (2023). A systematic literature review of empirical

research on technology education in early childhood education. *International Journal of Technology and Design Education*, *33*(3), 793–818. https://doi.org/https://doi.org/10.1007/s10798-022-09764-z

Erdem, C., & Koçyiğit, M. (2025). The interplay among school climate, instructional quality and teacher job satisfaction: Mediation of teacher motivation. *International Journal of Educational Development*, *114*, 103231. https://doi.org/https://doi.org/10.1016/j.ijedudev.2025.103231

Fadillah, A., Dewi, N., Ridho, D., Majid, A. N., & Prastiwi, M. N. B. (2017). The effect of application of contextual teaching and learning (CTL) model-based on lesson study with mind mapping media to assess student learning outcomes on chemistry on colloid systems. *International Journal of Science and Applied Science: Conference Series*, *1*(2), 101–108. https://doi.org/doi: 10.20961/ijsascs.v1i2.5128

Fadillah, A. R., Fitriyani, F., Helandri, J., & Yunus, M. (2025). Analysis Of Teacher Competency From An Islamic Perspective In The Implementation Of The Independent Curriculum In Vocational Schools. *El-Ghiroh: Jurnal Studi Keislaman*, *23*(1), 149–162. https://doi.org/https://doi.org/10.37092/el-ghiroh.v23i1.1121

Glynn, S. M., & Winter, L. K. (2004). Contextual Teaching and Learning of science in elementary schools. *Journal of Elementary Science Education*, *16*(2), 51–63. https://doi.org/10.1007/BF03173645

Gruszczynska, A., Merchant, G., & Pountney, R. (2013). " Digital futures in teacher education": exploring open approaches towards digital literacy. *Electronic Journal of E-Learning*, *11*(3), pp193--206.

Hidayat, R., Zainuddin, Z., & Mazlan, N. H. (2024). The relationship between technological pedagogical content knowledge and belief among preservice mathematics teachers. *Acta Psychologica*, *249*, 104432. https://doi.org/https://doi.org/10.1016/j.actpsy.2024.104432

Huang, K.-Y., Wie-Cheng, C., Yuexin, Z., Sheng-Wie, W., & and Wang, Q. (2025). A comparative study of technological pedagogical content knowledge between special education and general education in China. *Technology, Pedagogy and Education*, *34*(1), 19–33. https://doi.org/10.1080/1475939X.2024.2374284

Hunter, P. E., & Botchwey, N. D. (2017). Partnerships in learning: A collaborative project between higher education students and elementary school students. *Innovative Higher Education*, *42*, 77–90. https://doi.org/https://doi.org/10.1007/s10755-016-9363-x

Hyun, C. C., Wijayanti, L. M., Asbari, M., Purwanto, A., Santoso, P. B., Igak, W., Bernarto, I., & Pramono, R. (2020). Implementation of contextual teaching and learning (CTL) to improve the concept and practice of love for faith-learning integration. *International Journal of Control and Automation*, *13*(1), 365–383.

Iksal, I., Hayani, R. A., & Aslan, A. (2024). Strengthening character education as a response to the challenges of the times. *Indonesian Journal of Education (INJOE)*, *4*(3), 761–774. https://injoe.org/index.php/INJOE/article/view/116

Indrayadi, T., Kamil, D., Yusuf, M., Novetra, J., Sasferi, N., & others. (2020). The Effect Of Contextual Teaching And Learning On Reading Motivation. *International Journal of Scientific \& Technology Research*, *9*(02).

Jelena, O. Z., & Jelena, M. (2022). Quasi-Experimental Research as An Epistemological-Methodological Approach in Education Research. *International Journal of Cognitive Research in Science, Engineering and Education*, *10*(3), 177–183.

Jiménez Sierra, Á. A., Ortega Iglesias, J. M., Cabero-Almenara, J., & Palacios-Rodríguez, A. (2023). Development of the teacher's technological pedagogical content knowledge (TPACK) from the Lesson Study: A systematic review. *Frontiers in Education*, *8*(February). https://doi.org/10.3389/feduc.2023.1078913

Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: what is 'enhanced'and how do we know? A critical literature review. *Learning, Media and Technology*, *39*(1), 6–36. https://doi.org/https://doi.org/10.1080/17439884.2013.770404

Kristiawan, M., & Rahmat, N. (2018). Improving Teacher Professionalism Through Learning Innovation. *Journal of Iqra': Study of Educational Sciences*, *3*(2), 373–390. https://doi.org/https://doi.org/10.25217/ji.v3i2.348

Kurniawati, N., Maolida, E. H., & Anjaniputra, A. G. (2018). The praxis of digital literacy in the EFL classroom: Digital-immigrant vs digital-native teacher. *Indonesian Journal of Applied Linguistics*, *8*(1), 28–37.

Kuter, S., & and Sanal-Erginel, S. (2025). An analysis of a social sciences curriculum from the perspective of critical peace education. *Compare: A Journal of Comparative and International Education*, 1–17. https://doi.org/10.1080/03057925.2025.2452456

Labraña, J., Raf, V., & and Puyol, F. (2025). Nation-building and mass education in Chile: the rationales behind the expansion of education in Chile, 1810–1920. *International Studies in Sociology of Education*, 1–23. https://doi.org/10.1080/09620214.2025.2461718

Lloyd, G. M. (2009). School mathematics curriculum materials for teachers' learning: Future elementary teachers' interactions with curriculum materials in a mathematics course in the United States. *ZDM*, *41*, 763–775. https://doi.org/https://doi.org/10.1007/s11858-009-0206-4

Maharani, D., & Ok, A. H. (2025). The Influence of Public Elementary School Teachers' Authority on Students' Character. *Edueksos Jurnal Pendidikan Sosial \& Ekonomi*, *12*(2). https://doi.org/http://dx.doi.org/10.24235/edueksos.v12i2.19655

McDougall, T., & Phillips, M. (2024). Contextual considerations in TPACK: Collaborative processes in initial teacher education. *Computers and Education Open*, *7*, 100207. https://doi.org/https://doi.org/10.1016/j.caeo.2024.100207

Miedijensky, S., Sasson, I., & Yehuda, I. (2021). Teachers' Learning Communities for Developing High Order Thinking Skills—A Case Study of a School Pedagogical Change. *Interchange*, *52*(4), 577–598. https://doi.org/https://doi.org/10.1007/s10780-021-09423-7

Mishra, P. (2019). Considering Contextual Knowledge: The TPACK Diagram Gets an Upgrade. *Journal of Digital Learning in Teacher Education*, *35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611

Najib, M. (2023). The Effect of Contextual Teaching and Learning (CTL) Model on Civics Learning Outcomes of Elementary School Students. *EDUCARE: Journal of Primary Education*, *4*(1), 41–54. https://doi.org/https://doi.org/10.35719/educare.v4i1.198

Oved, O., & Alt, D. (2025). Teachers' technological pedagogical content knowledge (TPACK) as a precursor to their perceived adopting of educational AI tools for teaching purposes. *Education and Information Technologies*. https://doi.org/10.1007/s10639-025-13371-5

Panggabean, F. T. M., Pardede, P. O., Sitorus, R. M. D. S., Situmorang, Y. K., Naibaho, E. S., & Simanjuntak, J. S. (2021). Application of 21st Century Learning Skills Oriented Digital-Age Literacy to Improve Student Literacy HOTS in Science Learning in Class IX SMP. *Jurnal Mantik*, *5*(3), 1922–1930. https://iocscience.org/ejournal/index.php/mantik/article/view/1796

Paufler, N. A. (2018). Declining morale, diminishing autonomy, and decreasing value: Principal reflections on a high-stakes teacher evaluation system. *International Journal of Education Policy and Leadership*, *13*(8). https://doi.org/https://doi.org/10.22230/ijepl.2018v13n8a813

Pazilah, F. N., Harwati, H., & and Yunus, M. M. (2024). Refining the TPACK framework: a Fuzzy Delphi approach to 21st-century competency and self-efficacy constructs. *Cogent Education*, *11*(1), 2428886. https://doi.org/10.1080/2331186X.2024.2428886

Porras-Hernández, L. H., & Salinas-Amescua, B. (2025). Strengthening Tpack: A Broader Notion of Context and the Use of Teacher's Narratives to Reveal Knowledge Construction. *Journal of Educational Computing Research*, *48*(2), 223–244. https://doi.org/10.2190/EC.48.2.f

Prasittichok, P., Suradet, J., Khawanying, S., & and Hwang, G.-J. (2024). Technological solutions to fostering students' moral courage: an augmented reality-based contextual gaming approach. *Cogent Education*, *11*(1), 2378276. https://doi.org/10.1080/2331186X.2024.2378276

Pratiwi, A., Darmiany, D., & Setiawan, H. (2021). Character education values: is learning process in elementary school implement it? *Prisma Sains: Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *9*(2), 267–279. https://doi.org/https://doi.org/10.33394/j-ps.v9i2.4374

Rashid, T., & Asghar, H. M. (2016). Technology use, self-directed learning, student engagement and academic performance: Examining the interrelations. *Computers in Human Behavior*, *63*, 604–612. https://doi.org/https://doi.org/10.1016/j.chb.2016.05.084

Roh, Y. S., In Jang, K., & Lee, E. A. L. (2025). Influencing factors and learning outcomes in virtual simulation learning experiences: A structural equation modeling. *Nurse Education Today*, *150*, 106681. https://doi.org/https://doi.org/10.1016/j.nedt.2025.106681

Rohman, A., Muhtamiroh, S., Imron, A., & Miyono, N. (2023). Integrating traditional-modern education in madrasa to promote competitive graduates in the globalization era. *Cogent Education*, *10*(2), 2268456. https://doi.org/https://doi.org/10.1080/2331186X.2023.2268456

Safira, A., Arni, Y., Nadila, P., Pratiwi, S. A., & Batistuta, B. (2025). The Effect of Contextual Teaching Learning Model on Number Material on the Motivation of Elementary School Students in Grade 1 SD N 70 Palembang. *Invention: Journal Research and Education Studies*, 1–11. https://doi.org/https://doi.org/10.51178/invention.v6i1.2401

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological pedagogical content knowledge (TPACK) is the development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, *42*(2), 123–149. https://doi.org/https://doi.org/10.1080/15391523.2009.10782544

Shiu, W. H. C. (2025). Conceptualising the Pedagogical Purposes of Technologies by Technological, Pedagogical Content Knowledge and Substitution, Augmentation, Modification and Redefinition in English as a Second Language Classrooms. *Education Sciences*, *15*(4), 411. https://doi.org/https://doi.org/10.3390/educsci15040411

Smaldino, S. E., Lowther, D. L., Mims, C., & Russell, J. D. (2012). Instructional media and technology for learning. *International Journal of Distributed and Parallel Systems*, *3*(8).

Sunzuma, Gladys, & Umbara, Uba. (2025). Ethnomathematics-based technology in Indonesia: A systematic review. *Asian Journal for Mathematics Education*, *4*(1), 129–153. https://doi.org/10.1177/27527263241305812

Susilawati, S., Chakim, A., Hambali, M., Islamy, M. I., & Rahmaniah, A. (2021). The Urgency of Digital Literacy for Generation Z in Improving Learning of Islamic Religious Education. *Library*

Philosophy and Practice, *2021*, 1–16. https://digitalcommons.unl.edu/libphilprac/5143

Susilawati, S., Yaqin, M. Z. N., Wahidmurni, W., Ulfa, F. A., & Krismoneta, K. (2023). Training on Preparation of Islamic Integrated HOTS-Based Questions and Their Application in Online Learning in Elementary Schools. *Munaddhomah: Jurnal Manajemen Pendidikan Islam*, *4*(4), 867–877. https://doi.org/10.31538/munaddhomah.v4i4.459

Suwadi, Sulistyowati, E., Hazrullah, & Adira, H. F. (2025). Development of TPACK Instrument to Measure Teacher Knowledge in Islamic Education for In-Service Teacher Professional Training. *Educational Process: International Journal*, *16*. https://doi.org/10.22521/edupij.2025.16.193

Suwardika, G., Sopandi, A. T., Indrawan, I. P. O., & Masakazu, K. (2024). A flipped classroom with whiteboard animation and modules to enhance students' self-regulation, critical thinking and communication skills: a conceptual framework and its implementation. *Asian Association of Open Universities Journal*, *19*(2), 135–152. https://doi.org/10.1108/AAOUJ-10-2023-0115

Tavangarian, D., Leypold, M. E., Nölting, K., Röser, M., & Voigt, D. (2004). Is e-Learning the Solution for Individual Learning ? *Electronic Journal of E-Learning*, *2*, 273–280. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.116.8017&rep=rep1&type=pdf

Tseng, J.-J., Ching Sing, C., Lynde, T., & and Park, M. (2022). A critical review of research on technological pedagogical and content knowledge (TPACK) in language teaching. *Computer Assisted Language Learning*, *35*(4), 948–971. https://doi.org/10.1080/09588221.2020.1868531

Usman, S., Arafah, B., Marhum, M., Munir, S., Budi, & Tadeko, N. (2024). The Effect of Technological Pedagogical Content Knowledge (TPACK) on Rural Area Students' English Writing. *Journal of Language Teaching and Research*, *15*(3), 884–892. https://doi.org/10.17507/jltr.1503.21

Wani, N. U. H., Deshpande, A., Sidana, N., & Rasa, M. M. (2025). Determinants of higher education quality in Afghanistan's higher education sector: insights from students' perceptions. *Journal of Applied Research in Higher Education*, *17*(1), 123–138. https://doi.org/10.1108/JARHE-06-2023-0231

Yani, A., Asep, M., Rosita, & and Setiawan, B. (2025). Applying Technological Pedagogical Content Knowledge (TPACK) framework to geography online learning: What can teachers do? *Cogent Education*, *12*(1), 2482395. https://doi.org/10.1080/2331186X.2025.2482395

Yeh, Y.-F., Chan, K. K. H., & Hsu, Y.-S. (2021). Toward a framework that connects individual TPACK and collective TPACK: A systematic review of TPACK studies investigating teacher collaborative discourse in the learning by design process. *Computers & Education*, *171*, 104238. https://doi.org/https://doi.org/10.1016/j.compedu.2021.104238

About the Contributor(s)

Samsul Susilawati Maulana Malik Ibrahim State Islamic University Malang, Indonesia
Email: susilawati@pips.uin-malang.ac.id
ORCID: https://orcid.org/0000-0002-8312-8151

Triyo Supriyatno Maulana Malik Ibrahim State Islamic University Malang, Indonesia
Email: triyo@pai.uin-malang.ac.id
ORCID: https://orcid.org/0000-0002-6833-4555

Ahmad Fatah Yasin Maulana Malik Ibrahim State Islamic University Malang, Indonesia
Email: fatah@pai.uin-malang.ac.id
ORCID: https://orcid.org/0009-0004-5240-6165

Abdulloh Chakim Sayyid Ali Rahmatullah State Islamic University Tulungagung, Indonesia
Email: abdulloh.chakim@uninsatu.ac.id
ORCID: https://orcid.org/0009-0000-9611-0834

Candra Avista Putri Maulana Malik Ibrahim State Islamic University Malang, Indonesia
Email: 220103210022@student.uin-malang.ac.id
ORCID: https://orcid.org/0009-0004-7379-3934