https://proceedings.undip.ac.id/index.php/icocas/index ISSN: 3031-5794

Improving English Academic Achievement among Indonesian Junior High School Students through TPACK and Contextual Teaching

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Abstract. This study investigates the effectiveness of integrating the Technological Pedagogical Content Knowledge (TPACK) framework and Contextual Teaching and Learning (CTL) approach in improving English academic achievement among Indonesian junior high school students. Conducted using a true experimental design, the research involved 64 eighth-grade students at SMPN 1 Pringapus, divided equally into experimental and control groups. The experimental group received instruction through a TPACK-based and contextually rich learning model, while the control group was taught using conventional methods. Pre-test and post-test scores were analyzed using both descriptive and inferential statistics to determine the impact of the intervention. The results revealed a significant improvement in the academic performance of students in the experimental group compared to those in the control group. These findings suggest that integrating technology with pedagogical and content knowledge, supported by real-life contextualization, can enhance students' engagement and understanding, leading to better academic outcomes in English language learning. The study highlights the importance of innovative instructional strategies in addressing the challenges of English education in Indonesia.

Keywords: Academic achievement, TPACK, CTL, English Language Learning

1 Introduction

The current Indonesian education curriculum, particularly the Kurikulum Merdeka (Emancipated Curriculum), emphasizes technology in teaching and learning activities in the classroom. According to SEAMEO (2023) this curriculum aims to create a more flexible and student-centered learning environment, where technology is an important tool in improving educational experiences and outcomes [1]. As a result, the Integration in technology for the advancement of education also has become essential in pedagogical research, especially concerning student learning outcomes [2]. This requires teachers to have a deep understanding not only of the technology itself but

also of the subject matter and appropriate teaching strategies to ensure effective implementation in the classroom.

Despite the good potential of technology in education, technology integration in English as a Foreign Language (EFL) still faces various challenges, especially in schools in rural and semi-urban areas such as SMPN 1 Pringapus. One of the problems that teachers, especially in rural areas, usually face is limited access to technological resources. One of the problems that teachers and students in rural areas often face is limited access to educational technology resources. The limitations related to educational technology make the learning process difficult. Lack of access to technology in learning such as no internet access or lack of learning media like gadgets, laptop, or computer can obstruct learning activities. This aligns with a study conducted by Salam, R., Nurhadi, D., & Amalia (2023), which states that inadequate technological infrastructure, such as limited access to computers and unreliable internet connections, hinders effective technology integration in the EFL classroom [3].

Another challenge is the lack of proper training and professional development for teachers in using technology for teaching. Many teachers, especially in EFL contexts, may not have necessary skills or confidence to effectively integrate digital tools into their lessons. Poor teaching training prevents teachers from maximizing the potential of technology in the classroom, leading to ineffective implementation [4]. Without proper training, teachers may struggle to design engaging lessons, resolve technical issues and adapt digital resources for students' needs. Pringapus is one of the most underdeveloped areas in Semarang Regency, besides being located at the eastern end of Semarang Regency, Pringapus is also a new expansion area from Bergas Sub-district, so there are still many limitations in infrastructure and technology, especially in the education sector, which makes Pringapus people less familiar with modern educational technology and how to use it. Unfamiliarity with technology that can cause obstacles in EFL learning in the classroom is experienced by teachers and students.

This issue arises because the social conditions of the Pringapus community are predominantly classified as lower-middle class (subsistence), so they prioritize meeting their daily needs over long-term investments such as education. Pringapus Subdistrict is one of the subdistricts with the largest number of Pre-Prosperous Families. In Semarang Regency, the largest number of the Pre-Prosperous Family category is found in Suruh District, Tengaran District, Bringin District, Susukan District, and Pringapus District (Fauzyah & Ari, 2017). The research findings indicate that many residents of Pringapus fall into the poor category, as evidenced by the high percentage of recipients of the Prosperous Family Card. According to Scott (1994),

communities living on the subsistence level prioritize security or safety and reliability over long-term benefits [5]. Education is a form of long-term investment, which is why many Pringapus residents do not prioritize education, as the majority still belong to subsistence communities that view education as not a primary human need. Given this, it is no surprise that many Pringapus residents have not prioritized educational facilities for their children, instead focusing on daily necessities. This situation makes SMPN 1 Pringapus an ideal school for conducting this research.

As for the students of SMPN 1 Pringapus, one of the problems faced by students, which is also a concern for teachers, is limited access to technology and internet connections. Not all students have personal devices or stable internet access, which creates a digital divide. A study conducted by Susanto et.al (2023), found that students in rural areas in Indonesia struggle with technology-based learning due to poor internet connectivity and lack of adequate learning devices [6]. Students at SMPN 1 Pringapus experience this problem, where most students do not have their devices.

Another issue is lack of digital literacy, where some students, especially younger learners, struggle to use digital platforms and use online learning tools effectively. Students with low digital literacy often struggle to engage in technologybased learning, leading to frustration and decreased academic performance [7]. Moreover, difficulty in maintaining motivation and engagement is also an essential challenge in technology based EFL learning environments. Although technology can enhance learning experience, the implementation process can unintentionally decrease students' engagement and motivation. A study by Jahedizadeh et al (2016) found that EFL learners' perceptions of classroom activity significantly affected their demotivation, affecting their language achievement and contributing to burn out [8]. The lack of positive use of technology in the learning process results in low motivation and innovation in the development of learning strategies. The results of research submitted by Tuyen & Tien (2019) identified factors such as lack of learning strategies, lower learning aptitude, and previous unpleasant learning as the main contributors to students' demotivation in EFL learning [9]. These findings suggest that while technology offers innovative ways of teaching, it can also pose difficulty that impacts students' engagement and motivation because students have not been able to make effective and positive use of existing technology. Based on the description of these problems, there is a need for innovation to effectively integrate technology into EFL learning and also overcome the challenges faced by teachers and students in rural areas such as SMPN 1 Pringapus. One learning framework that supports such innovation is TPACK (Technology, Pedagogy, and Content Knowledge), which provides a structured approach to technology integration in education. Developed by Mishra and Koehler in 2006, TPACK focuses on the interaction between three aspects of knowledge, such as Technological Knowledge (TK), Pedagogical Knowledge (PK),

and Content Knowledge (CK) [10].

Based on the description of the problems described above, as well as the field conditions from the observations made by the researcher, the researcher intends to conduct experimental research by combining TPACK and CTL. This research seeks to explore how integration between these two learning approaches can complement each other to create a more inclusive, engaging and effective EFL learning environment for students at SMPN 1 Pringapus. This research offers a balanced approach that utilizes technology in the classroom while aligning learning in real-world contexts to improve students' academic achievement in learning EFL.

2 Methods

This study uses a quantitative research method with a true experimental design to test the effectiveness of integrating the TPACK-based learning model and Contextual Teaching and Learning (CTL) in improving students' academic achievement in English. According to Sugiyono (2019), quantitative research is a systematic method used to obtain objective data through measurable procedures [11].

The research population consisted of all eighth-grade students at SMPN 1 Pringapus in the 2024/2025 academic year. Two classes were selected using purposive sampling based on specific criteria: students had received at least one year of English instruction and had not been exposed to TPACK or CTL- based teaching approaches before. One class was assigned as the experimental group, which received instruction through the integrated TPACK and CTL approaches, while the other class served as the control group, which received conventional instruction.

To measure students' English academic achievement, pre- and post-tests were conducted. Each test consisted of 30 multiple-choice questions covering listening, reading comprehension, grammar, vocabulary, and basic writing skills. The questions were designed based on the learning objectives in the curriculum and the material presented during the learning sessions.

Before conducting the main analysis, the test questions underwent validity and reliability tests to ensure their suitability and consistency in measuring English academic achievement. Following this, the data was analyzed using descriptive statistical analysis to summarize student performance, followed by a normality test to ensure the data met the assumptions for parametric testing. Finally, a paired t-test was conducted to determine whether there were significant differences in students' English academic performance before and after the implementation of TPACK- and CTL-based instruction.

3 Result and Discussion

3.1 English Academic Achievement

This section presents the analysis of students' academic achievement in learning English before and after the application of TPACK and Contextual Teaching and Learning (CTL) based learning models. Data were obtained from the pretest and posttest given to the experimental and control groups. To ensure the accuracy and reliability of the test results, a series of analyses were conducted, including validity tests, reliability analysis, and statistical procedures. The results of these tests provide an overview of how the applied learning model affects students' performance in English.

3.1.1 Validity and Reliability Testing

a. Validity

The pretest instrument, consisting of 30 multiple-choice items with dichotomous scoring (1 for correct, 0 for incorrect) went through a comprehensive validity assessment. The main method used was item-total correlation analysis, specifically by calculating the Pearson Product-Moment Correlation Coefficient for each item score against the total score obtained from all items (Qtotal). This approach helps determine the extent to which each item measures the same construct as the overall instrument.

The analysis was conducted with a sample of 32 participants. To establish the validity of each item, a two-sided significance level (α) of 0.05 was used. With the degrees of freedom (df) calculated as N-2 (32-2 = 30), the critical r- value (r-table) derived from the standard statistical table is 0.349. An item is considered valid if the calculated Pearson correlation coefficient with Qtotal is greater than this critical r-value and/or if the associated p-value (Sig. 2-tailed) is less than 0.05. This dual criterion ensures the strength and statistical significance of the relationship between the items and the construct as a whole. The results of the validity assessment indicated that the pretest instrument had a high level of item validity. A large majority, specifically 28 out of 30 items (93.3%), were found to be valid and consistently showed significant positive correlations with the knowledge total score. For example, some items showed strong correlations above the essential level, such as Q1 ($r = 0.705$, $p = 0.000$), Q2 ($r = 0.788$, $p = 0.000$), Q11 ($r = 0.776$, $p = 0.000$), Q17 ($r = 0.722$, $p = 0.000$), and Q24 ($r = 0.720$, $p = 0.000$). These high correlations indicate that the items effectively differentiate between participants' different levels of knowledge and make

a meaningful contribution to the overall measurement of the targeted construct.

b. Reliability

The reliability of the pretest instrument, which consisted of 28 valid multiple choice items (after excluding Q12 and Q26 based on the previous validity analysis), was assessed using the split-half reliability method. This approach evaluates the internal consistency of an instrument by dividing it into two parts and examining the correlation between the scores obtained from the two parts, which are then adjusted to estimate the full test reliability. The 28 items were logically divided into two parts based on their sequential order in the instrument: Part 1 consists of 14 items (Q1-Q11, Q13-Q15) and Part 2 consists of the remaining 14 items (Q16-Q25, Q27-Q30). All 32 participants provided complete answers to all questions included in this analysis, so there were no missing data.

3.1.2 Descriptive Statistical Analysis

Descriptive statistics are methods used to summarize and describe the main features of a data set.

Table 1. Descriptive Statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
pretest_eksperimen	32	0	27	11.69	8.690
posttest_eksperimen	32	22	30	26.25	1.704
pretest_control	32	3	27	16.09	6.669
posttest_control	32	17	27	22.47	2.423
Valid N (listwise)	32				

Descriptive analysis of the data revealed important initial insights into the performance of the experimental and control groups. Specifically, both groups showed an increase in average knowledge scores from pretest to posttest. However, the magnitude of this increase varied greatly between the two. The experimental group showed a substantial increase in their average score, rising from a baseline average of 11.69 to 26.25 on the posttest, which represents an impressive increase of 14.56 points. In contrast, the control group, although also showing progress, recorded a more modest increase from a pretest average of 16.09 to a posttest average of 22.47, which represents an improvement of 6.38 points.

In addition, significant differences were also seen in the distribution of posttest scores. On average, the experimental group scored significantly higher on the posttest. More importantly, their posttest scores were also much more homogeneous, as evidenced by

the much smaller standard deviation compared to the control group (1.704 vs. 2.423). The greater increase in mean scores, coupled with the tighter clustering of high scores, provides strong preliminary evidence, indicating that the intervention had a stronger, consistent, and positive effect in improving the experimental group's knowledge.

3.1.3 Normality Testing

The normality test is used to determine whether the distribution of data for a variable follows a normal distribution (bellshaped, symmetrical). This is an important assumption for many parametric statistical tests, such as the t-test, as these tests assume that the data being analyzed comes from a normally distributed population

Table 2. Normality Test.

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest_experimental	.150	32	.065	.916	32	.159
posttest_experimental	.152	32	.058	.959	32	.257
pretest_control	.112	32	.200*	.954	32	.188
posttest_control	.118	32	.200*	.976	32	.686

The assessment of data distribution for all four groups experimental pretest, experimental posttest, control pretest, and control posttest - consistently demonstrated normality. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests yielded significance values (p-value) greater than 0.05 for all data sets. In particular, for the Shapiro-Wilk test, which is generally preferred for sample sizes of N=32, all p-values were well above the alpha level of 0.05.

These results lead to the conclusion that we fail to reject the null hypothesis, thereby confirming that all observed data distributions are consistent with a normal distribution. This confirmation of normality is very important, as it validates the use of parametric statistical tests for subsequent inferential analysis, ensuring the appropriateness of the statistical procedures applied to compare groups and evaluate intervention effects.

3.1.3 Paired T-Test

Based on the results of the paired-samples t-test, there was a statistically significant increase in the experimental group's knowledge score from pretest to posttest ($t(31) = -9.289$, $p<0.0001$). The average knowledge score of students in the experimental group substantially increased by 14.563 points after the implementation of the intervention. This indicates that the intervention had a positive and significant effect in improving the knowledge of students in the experimental group.

4 Conclusion

Based on the results and discussion that have been described in the previous chapter, the researcher draws the following conclusions draw the following conclusions:

1. The Initial Condition of English Learning in Class VIII, before the treatment of integrating TPACK and CTL learning models, was observed to be that students were less enthusiastic about participating in English learning activities due to the lack of contextual learning they received. In addition, teachers are often very focused on one textbook in their teaching. Students who learn English by using Student Books and LKS feel bored with the amount of material available. So it is necessary to have a learning model that does not only teach English theoretically, but there needs to be the use of technology combined with English theoretically but there needs to be the use of technology combined with conditions that are following the learning context.

2. Based on the pretest and posttest results, it can be concluded that there is a strong influence between the integration of TPACK and CTL on the English learning outcomes of grade VIII students at SMPN 1 Pringapus marked by Asymp from the T-test with Sig (0.002) < p-value (0.05) and CC value which is 0.07. There is an influence between the integration of TPACK and CTL on students' motivation and interest in the English learning process of class VIII students of SMPN 1 Pringapus with the results of observing the frequency of student activeness and the results of Likert scale measurements of stusdent interest and motivation showing students are more enthusiastic in learning English.

References

1. SEAMEO. Report on the implementation of Kurikulum Merdeka in Southeast Asia. Southeast Asian Ministers of Education Organization; 2023.
2. Hikmah N. Integrasi teknologi dalam pendidikan: Tantangan dan solusi dalam pembelajaran Bahasa Inggris. J Pendidik Teknol. 2023;18(2):122–131.
3. Salam, R., Nurhadi, D., & Amalia R. The digital divide in Indonesian rural schools: A challenge in the implementation of Kurikulum Merdeka. J Teknol Pendidik. 2023;25(3):150–162.
4. Rahman, A., & Sari MK. Teachers' readiness and challenges in using digital tools in EFL classrooms. J Educ Res Innov. 2023;9(3):44–57.
5. Scott J. Moral Ekonomi Petani. Jakarta: LP3ES; 1994.
6. Susanto, R., Hasanah, N., & Dewi S. Barriers to technology-based learning in rural Indonesian schools: A case study. Indones J Educ Stud. 2023;11(1):33–45.
7. Anthonysamy L. Exploring the relationship between digital literacy and self- regulated learning. Educ Inf Technol. 2019;25(4):3041–3069.

8. Jahedizadeh, S., Ghanizadeh, A., & Rostami S. The role of EFL learners' perceptions of classroom activities in predicting their academic burnout. J Psycholinguist Res. 2016;45(6):1329–1343.
9. Tuyen, L. T. T., & Tien NH. Demotivation in learning English: An analysis of EFL learners' perceptions. J Lang Educ. 2019;5(3):95–104.
10. Mishra, P., & Koehler MJ. Technological pedagogical content knowledge: A framework for teacher knowledge. Teach Coll Rec. 2006;108(6):1017–1054.
11. Sugiyono. Metode penelitian kuantitatif, kualitatif, dan R&D. Alfabeta; 2019.
12. Johnson EB. Contextual teaching and learning: What it is and why it's here to stay. Corwin Press; 2002.