

## Identification of Technological Pedagogical Content Knowledge of Pre-Service Teacher in English Language Learning

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### Abstract:

This study aims to identify the competencies of prospective early childhood teachers in integrating Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK). This study uses a descriptive method and data is collected through a structured questionnaire. The sample consisted of 20 students from the Early Childhood Teacher Education Study Program, class of 2021. The results of the study show that high performance in TPACK with the "Very Good" category connects strong mastery of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) which means that the student is not only proficient in using technology but also in teaching and understanding content very effectively. The "Good" category often shows increased pedagogical and content knowledge and the ability to apply technology better. Meanwhile, students with "Average" performance generally have a basic understanding of all components but still have difficulty integrating them effectively. The "Medium" category appears in the components of Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Pedagogical Content Knowledge (PCK). In this case, additional support is needed to improve the skills of prospective teacher students in combining technology, pedagogy, and content.

**Keywords:** TPACK, pre-service teacher abilities, English language learning

## INTRODUCTION

In the era of globalization, English language proficiency is becoming important as a means of international communication. However, English language learning in Indonesia still faces various challenges. According to (Muhlison, 2014), one of the main challenges is the lack of exposure to the use of English in everyday contexts, which causes students to have difficulty in applying the language practically. In addition, teaching methods that still focus on grammar and vocabulary memorization often fail to develop students' communicative skills (Hasanah and Ulya, 2020). This results in low learning motivation and a lack of student confidence in using English.

On the other hand, technological developments open up new opportunities in language learning. The use of technology in education, or what is known as Technology-Enhanced Language Learning (TELL), has shown significant potential in increasing the effectiveness of English language learning (Koehler *et al.*, 2013). Technology can provide access to authentic resources, facilitate meaningful language interactions, and create a more engaging and interactive learning environment. However, the integration of technology in English language learning is not without challenges. The effective use of technology in teaching requires a complex understanding of the interactions between content, pedagogy, and technology (Nurhadi *et al.*, no date). (NUrlaela, 2012) add that this concept is known as Technological Pedagogical Content Knowledge (TPACK), which is an important framework for preparing teachers to integrate technology effectively in their teaching.

Understanding TPACK benefits prospective preschool teachers in many ways, such as being able to present learning interestingly with the help of various technological media. The development of new technology and its integration into the teaching and learning process can present various information and learning materials that are interesting and effective (Nuha, 2020). The integration of technology into the teaching process can modify the teaching style by incorporating new and non-monotonous learning styles (Benson and Ward, 2013). The ability of prospective preschool teachers to adapt technology has the potential to improve students' processes and learning outcomes, especially in English learning. Finally, this study was conducted to see the TPACK abilities of prospective preschool teachers in learning English so that later prospective teachers can provide creative and innovative learning outcomes.

In the context of Early Childhood Education, English learning has its characteristics and challenges. Children at an early age have extraordinary abilities in

absorbing new languages but also require a learning approach that is appropriate to their developmental stage (Erna *et al.*, 2021). The use of technology in English learning for early childhood must consider aspects of children's cognitive, social, and emotional development (Qur'ani Putri *et al.*, 2023).

Given the importance of the role of teachers in integrating technology into English learning, especially at the early childhood level, it is crucial to examine the readiness of prospective teachers in this regard. The TPACK ability of prospective teachers in the context of English learning will greatly determine the effectiveness of the use of technology in facilitating language learning in early childhood (Ayu Ningsih *et al.*, 2024). Stimulating children's English from an early age can help improve various skills that support children's development (Schmidt *et al.*, 2009). Children can understand receptive language faster than their ability to communicate or express themselves. The English learning process at the early childhood level can start from the vocabulary enrichment process, which is packaged or taught through songs, picture cards, games, videos, or other media (Cameson, 2007).

Based on this background, this study aims to analyze the Technological Pedagogical Content Knowledge (TPACK) abilities of prospective Early Childhood Education teachers in the context of English learning. The results of this study are expected to provide valuable insights for the development of early childhood teachers' preparation programs and improve the quality of English learning for early childhood by utilizing technology effectively. Based on the background explanation above, it is necessary to research the TPACK abilities of prospective early childhood teachers in English learning so that later prospective teachers can provide creative and innovative learning to students.

## METHOD

This study was a qualitative study that used a quantitative approach with a cross-sectional design (Liao, Shen and Chu, 2009). This method was chosen to analyze the Technological Pedagogical Content Knowledge (TPACK) abilities of prospective Early Childhood Education teachers in the context of English learning. The sample in this study was 20 students from the early childhood education study program in 2021. The research instruments used were Observation Sheets and documentation rubrics. The observation sheet was used to observe the TPACK abilities of prospective teachers in teaching practice. Meanwhile, the documentation rubric was used to assess the lesson plans and materials produced by prospective teachers. Data were

collected through direct observation of micro-teaching practices and analysis of the documentation of lesson plans and materials produced by prospective teachers.

Quantitative descriptive is used to compile and enter the collected data in a table and determine the frequency to facilitate the calculation of the percentage of student scores using the formula (Suyamto, Masykuri and Sarwanto, 2020).

$$P = F/N \times 100\%$$

Description:

F = Total Respondent Values

N = Total Values

P = Percentage

After obtaining the percentage of respondents' scores, data interpretation was carried out to give meaning to the data obtained based on the questionnaire results, with the following categories (Ahmad *et al.*, 2022):

Table 1. Percentage Range

Percentage Range	Category
85% - 100%	Very good
70% - <85%	Good
50% - <70%	Moderate
20% - <50%	Low
0% - <20%	Very Low

The content validity and reliability test was carried out by three experts in the field of TPACK, and educational technology where they assessed the suitability of the items in the observation and documentation instruments with the TPACK construct and the context of English learning for Early Childhood. The Content Validity Index was calculated for each item and the entire instrument, with a minimum limit of 0.80 to be considered valid (Nevrita, Asikin and Amelia, 2020).



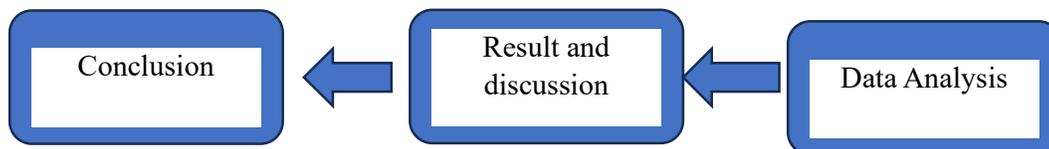


Diagram 1. Research Flow

## RESULT AND DISCUSSION

### Analysis of Technological Knowledge (TK)

Table 1. Final Score of Pre-service teachers' Technological Knowledge

NAME	TK	CATEGORY
R1	84%	Good
R2	84%	Good
R3	80%	Good
R4	80%	Good
R5	84%	Good
R6	80%	Good
R7	80%	Good
R8	80%	Good
R9	84%	Good
R10	76%	Good
R11	80%	Good
R12	80%	Good
R13	76%	Good
R14	80%	Good
R15	88%	Very Good
R16	84%	Good
R17	92%	Very Good
R18	84%	Good
R19	84%	Good
R20	84%	Good

This data provides an overview performance of prospective preschool teachers, most of whom are in the “Good” category with a few “Very Good” performances. From 20 students, there are 17 students with Technological Knowledge (TK) abilities ranging from 76% to 84% indicating the “Good” category in knowledge

of technology use. Meanwhile, only two students are in the range of 88% to 92% indicating the "Very Good" category.

### Analysis of Pedagogical Knowledge (PK)

Table 2. Final Score of Pre-service teachers' Pedagogical Knowledge

NAME	PK	CATEGORY
R1	72%	Good
R2	72%	Good
R3	76%	Good
R4	76%	Good
R5	80%	Good
R6	84%	Good
R7	88%	Very Good
R8	80%	Good
R9	84%	Good
R10	80%	Good
R11	80%	Good
R12	80%	Good
R13	80%	Good
R14	68%	Moderate
R15	92%	Very Good
R16	72%	Good
R17	92%	Very Good
R18	80%	Good
R19	84%	Good
R20	80%	Good

Most students are in the "Good" category with a percentage ranging from 72% to 84% in Pedagogical Knowledge (PK) ability. Three people have "Very Good" performance with a percentage of more than 88%. There is only one student in the "Moderate" category with the lowest score, which is 68%. Overall, these data show that the performance of the majority of students is good, with some performing very well, and only one at the moderate level.

### Analysis of Content Knowledge (CK)

Based on the data above, the majority of prospective PAUD teacher students are in the "Good" category with a percentage of between 72% and 84%, indicating

good overall performance. There are three students in the "Very Good" category with the highest percentage of 88%. Four students are in the "Moderate" category, with Content Knowledge (CK) scores below 70%, which require improvement. Overall, these data describe the performance of mostly good students, with some very good performances, but some need to be improved, namely students who are in the moderate category.

Table 3. Final Score of Pre-service teachers' Content Knowledge

NAME	CK	CATEGORY
R1	80%	Good
R2	80%	Good
R3	80%	Good
R4	76%	Good
R5	80%	Good
R6	80%	Good
R7	80%	Good
R8	88%	Very Good
R9	68%	Moderate
R10	68%	Moderate
R11	76%	Good
R12	64%	Moderate
R13	76%	Good
R14	72%	Good
R15	88%	Very Good
R16	64%	Moderate
R17	84%	Good
R18	80%	Good
R19	88%	Very Good
R20	80%	Good

### Analysis of Technological Pedagogical Knowledge (TPK)

Overall, these data show that most of the student teachers performed well in their Technological Pedagogical Knowledge (TPK) skills, with some students performing very well, and some others in the moderate category (Abbitt, 2011). The data above shows that the majority of students are in the "Good" category, with a percentage range of 72% to 84%, one student is in the "Very Good" category with the

highest TPK score of 92%. Six students are in the "Moderate" category, with performances ranging from 60% to 68%.

Table 4. Final Score of Pre-service teachers' Technological Pedagogical Knowledge

NAME	TPK	CATEGORY
R1	80%	Good
R2	72%	Good
R3	80%	Good
R4	72%	Good
R5	84%	Good
R6	84%	Good
R7	60%	Moderate
R8	82%	Good
R9	64%	Moderate
R10	68%	Moderate
R11	76%	Good
R12	60%	Moderate
R13	76%	Good
R14	80%	Good
R15	92%	Very Good
R16	60%	Moderate
R17	84%	Good
R18	84%	Good
R19	84%	Good
R20	84%	Good

### Analysis of Pedagogical Content Knowledge (PCK)

The Pedagogical Content Knowledge (PCK) analysis data above shows that the majority of students' performance is in the "Moderate" category, with several people in the "Good" category and one person who stands out in the "Very Good" category. There are 11 out of 20 people in the "Moderate" category, with PCK percentages ranging from 56% to 64%. Six students have "Good" performance with a range of 72% to 80%. Only three students are in the "Very Good" category with the highest percentage of 88%, indicating very good performance.

Table 5. Final Score of Pre-service teachers' Pedagogical Content Knowledge

NAME	PCK	CATEGORY
R1	60%	Moderate
R2	60%	Moderate
R3	60%	Moderate
R4	60%	Moderate
R5	56%	Moderate
R6	80%	Good
R7	60%	Moderate
R8	80%	Good
R9	60%	Moderate
R10	60%	Moderate
R11	60%	Moderate
R12	72%	Good
R13	64%	Moderate
R14	80%	Good
R15	80%	Good
R16	60%	Moderate
R17	88%	Very Good
R18	88%	Very Good
R19	72%	Good
R20	88%	Very Good

### Analysis of Technological Content Knowledge (TCK)

The data above shows that the majority of students' Technological Content Knowledge (TCK) abilities are in the "Good" category, with TCK values ranging from 76% to 84%, indicating good performance but not yet at the peak. As many as five students are in the "Very Good" category with a percentage of 88%, indicating very satisfactory and consistent performance. Overall, these data show that on average students have good performance, but there are most who have very good performance with the highest value at 88%.

Table 6. Final Score of Pre-service Teachers' Technological Content Knowledge

NAME	TCK	CATEGORY
R1	76%	Good
R2	80%	Good
R3	80%	Good
R4	84%	Good
R5	82%	Good
R6	82%	Good
R7	76%	Good
R8	76%	Good
R9	80%	Good
R10	76%	Good
R11	76%	Good
R12	84%	Good
R13	84%	Good
R14	88%	Very Good
R15	88%	Very Good
R16	80%	Good
R17	88%	Very Good
R18	88%	Very Good
R19	80%	Good
R20	88%	Very Good

### Analysis of Technological Pedagogical and Content Knowledge (TPACK)

The data above shows that the "Medium" category dominates with nine students, indicating performance that needs improvement. The "Good" category consists of seven students with a percentage of Technological Pedagogical Content Knowledge (TPACK) between 72% and 80%. The "Very Good" category is owned by four people who achieved the highest percentage, which is 88%, indicating very satisfactory performance. Overall, these data show that the majority of prospective preschool teacher students are in the "Medium" and "Good" categories, with several students showing extraordinary performance in the "Very Good" category.

Table 7. Final Score of Pre-service teachers' Technological Pedagogical and Content Knowledge

NAME	TPACK	CATEGORY
R1	68%	Moderate
R2	60%	Moderate
R3	72%	Good
R4	64%	Moderate
R5	72%	Good
R6	80%	Good
R7	68%	Moderate
R8	84%	Good
R9	60%	Moderate
R10	60%	Moderate
R11	76%	Good
R12	64%	Moderate
R13	68%	Moderate
R14	80%	Good
R15	88%	Very Good
R16	68%	Moderate
R17	88%	Very Good
R18	88%	Very Good
R19	80%	Good
R20	88%	Very Good

In the context of education and technology integration, the relationship between various types of knowledge, namely Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), and Technological Pedagogical Content Knowledge (TPACK) is complex and interrelated (Phillips and Stern, 1986).

This study illustrates how different knowledge of pre-service early childhood teachers interact and influence the overall performance of educational competencies in integrating technology (Witek, no date). High percentage scores often reflect better mastery in combining technology with teaching methods and content taught. Technological Knowledge (TK) is the foundation needed to understand how technology can be used in educational contexts. Without Technological Knowledge, the understanding and application of technology in teaching will be limited (Richards and Rodgres, 1996). The relevance between TPACK scores and Technological

Knowledge can be inferred from the percentage scores and categories given. For example, students with a score of "Very Good" in TPACK demonstrate very high proficiency in integrating technology that is directly related to understanding technology.

Pedagogical Knowledge (PK) is a knowledge about how to teach and manage learning (Chen, 2013). Pedagogical Knowledge focuses on the methods used to deliver material that are essential for effective instructional design. Students who score high in the "Good" and "Very Good" categories indicate that the individual has strong pedagogical competence, can apply effective teaching methods, and uses technology in ways that support learning (Mohamed AbdelWahab, 2013).

Meanwhile, Content Knowledge (CK) includes a deep understanding of pre-service teacher students about what is being taught (Quddus, 2020). The knowledge of prospective teachers is very important so that teaching can be carried out accurately and deeply. Students with the category "Very Good" show deep content knowledge and can integrate technology effectively in delivering the content provided.

Based on the research data, the high TPACK category reflects the ability of prospective teachers to combine technology with pedagogical methods effectively. Technological Pedagogical Knowledge in this study seeks to integrate technology appropriately into the teaching methods of prospective teacher students. The "Very Good" percentage indicates that students not only understand technology but can also use it in a way that supports their teaching methods. Pedagogical Content Knowledge (PCK) of students with the category "Good" shows that they can teach content effectively using the right pedagogical methods (Yıldız, 2017). However, the results of the study showed that the PCK of prospective teacher students was dominated by the category "Moderate" which means that there needs to be an improvement in the pedagogical competence of prospective teacher students.

Technological Content Knowledge (TCK) provides a snapshot of knowledge about how technology can be used to support and deliver content (Yuksel and Yasin, 2014). Data showing high performance in TPACK with a score of "Very Good" reflects a good understanding of how technology effectively supports content delivery by pre-service teachers who are included in TCK. Technological Pedagogical Content Knowledge (TPACK) describes the knowledge of how to integrate technology, pedagogy, and content holistically to facilitate effective learning (Ning *et al.*, 2022). The TPACK category of "Very Good" was demonstrated by several students. This means that student teachers can integrate all components effectively. Students with the "Very Good" and "Good" categories are not only proficient in technology but also understand how to teach content with appropriate technology and pedagogical methodologies.

High performance in TPACK with a “Very Good” rating relates to strong mastery of TK, PK, and CK. Individuals with high TPACK scores demonstrate the ability to integrate technology with pedagogy and content effectively. Transitioning from “Moderate” to “Good” often indicates increased pedagogical and content knowledge and the ability to apply technology better. A preservice teacher’s achievement in the “Very Good” rating indicates excellent integration of TK, PK, CK, and TPACK, meaning that the student is proficient in using technology and teaching and understanding content very effectively.

## CONCLUSION

This study aims to identify the competencies of prospective early childhood teachers in integrating Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK). The results of the study show that high performance in TPACK with the “Very Good” category connects strong mastery of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) which means that the student is not only proficient in using technology but also in teaching and understanding content very effectively. The “Good” category often shows increased pedagogical and content knowledge and the ability to apply technology better. Meanwhile, students with “Average” performance generally have a basic understanding of all components but still have difficulty integrating them effectively. The “Medium” category appears in the components of Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Pedagogical Content Knowledge (PCK). In this case, additional support is needed to improve the skills of prospective teacher students in combining technology, pedagogy, and content.

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