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INTEGRATION OF TPACK IN FPEB LECTURERS' TEACHING PRACTICES: CHALLENGES AND OPPORTUNITIES

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ABSTRACT
Objectives: TPACK for lecturers lies in the importance of preparing lecturers to face educational challenges in the digital age. Through this research, educational institutions can understand how lecturers combine technology with pedagogy and content to improve the quality of teaching. TPACK research also enables more effective curriculum adjustments, professional development, and learning innovations, thereby improving student learning outcomes and supporting the successful implementation of educational technology in the future. Method: The method used was a survey of randomly selected students from the Faculty of Economics and Business Education, who were given a 7-point numerical questionnaire. Hypothesis testing was performed using least squares model analysis. Findings: Lecturers' technological knowledge and pedagogical knowledge were in the high category, while their content knowledge, technological content knowledge, and pedagogical and content knowledge were in the moderate category. Based on the research, TPACK is strongly and significantly influenced by technology and pedagogical knowledge. Conclusion: This study provides information that lecturers can teach by integrating technology with teaching methods in accordance with the content being taught. Lecturers can use digital platforms to help deliver teaching materials and conduct evaluations, thereby increasing the effectiveness, efficiency, and relevance of education in the digital age. Technology provides greater flexibility, effectiveness, and relevance in the learning process. In addition, technology increases interaction, innovation, and student engagement, while preparing them with relevant skills for the future workplace.

Keywords: TPACK, digital education integration, lecturer competency development

INTRODUCTION

Curriculum implementation involves three main aspects: planning, execution, and assessment. According to Hamalik (in Salabi, 2020), planning aligns with the institution's vision and mission, implementation puts the plan into action using appropriate methods, tools, and responsibilities, and evaluation assesses outcomes to provide useful information. Collaboration among educators is essential to design a curriculum that follows established guidelines. Teachers play a key role in this process, preparing learning materials by setting objectives, selecting methods, delivering content, choosing resources, and conducting evaluations (Dolong, 2016). Effective teachers combine professional skills with intellectual, emotional, and spiritual intelligence (Sidik, 2016).

Modern educational challenges require teachers to use technology effectively. In the digital era, educators act as facilitators, motivators, and mentors, providing opportunities for students to explore learning resources (Sadriani, Ahmad, & Arifin, 2023). The TPACK framework (Technological Pedagogical Content Knowledge) helps teachers integrate technology with pedagogy and content (Koehler et al., 2013). Its components Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and TPACK itself enable teachers to design, implement, and plan effective learning that improves education quality (Agustini, Santyasa, & Ratminingsih, 2019; Kadıoğlu, 2023; Ning, 2024).

Teachers' competencies, including pedagogical, professional, personal, and social skills, are essential for effective teaching (Law of the Republic of Indonesia Number 14 of 2005, Chapter IV, Article 10). Research shows that collaborative and personalized methods, such as conferences, forums, and webinars, enhance pedagogical and professional skills (Safin, 2020; Handini, 2024). Integrating these competencies with technology through digital literacy and ICT skills supports interactive, collaborative learning and develops 21st-century skills (Alim & Aryani, 2024; Omosekejimi, 2018). Strong TPACK skills allow teachers to combine technology, pedagogy, and content effectively, creating engaging learning environments that increase student motivation and achievement (Absari et al., 2020; Yuliana et al., 2023).

METHOD

The method used in this study was a survey, with the research sample taken randomly from students of the Faculty of Economics and Business Education. The numerical results of the study amounted to 7 points. Due to the relatively small sample size, the Least Square model analysis was used to test the research hypothesis.

RESULTS AND DISCUSSION

RESULTS

1. Variable Description

Table 1. Overview of TPACK

Category	Range	Frequency	Percentage
High	**≥ 100**	**119**	**79**
Medium	59 – 99	29	21
Low	≤ 60	0	0
Total		**140**	**100**

Source: Appendix (processed data)

Based on Table 1.1, it can be seen that the general description of *the Technological Pedagogical Content Knowledge* (TPACK) level of lecturers at the Faculty of Economics and Business Education (FPEB) at the Indonesia University of Education is in the high category. A total of 79% of students from each study program have a high perception of *the Technological Pedagogical Content Knowledge* (TPACK) of lecturers. It can be concluded that students from each study program at the Faculty of Economics and Business Education (FPEB) have a good perception of *the Technological Pedagogical Content Knowledge* (TPACK) of lecturers. Furthermore, we can see the average scores of each statement item for each *Technological Pedagogical Content Knowledge* (TPACK) indicator as shown in Table 1.2.

Table 2. TPACK Categories Based on Indicators

No	Indicator	Maximum Score	Average Score	Category
1	*Technological Knowledge*	35	28.42	High
2	*Pedagogical Knowledge*	42	30.53	High
3	*Content Knowledge*	21	11.48	Moderate
4	*Technological Content Knowledge*	21	15.59	Moderate
5	*Pedagogical Content Knowledge*	21	14.07	Moderate

Source: Appendix (processed data)

Table 1.2 shows that of the five indicators *of Technological Pedagogical Content Knowledge* (TPACK), only two indicators are in the high category, namely *Technological Knowledge* (TK) and *Pedagogical Knowledge* (PK). Meanwhile, the other three indicators, namely *Content Knowledge* (CK), *Technological Content Knowledge* (TCK), and *Pedagogical Content Knowledge* (PCK) are in the moderate category. Next, the indicators of each *Technological Pedagogical Content Knowledge* (TPACK) will be explained in more detail.

***Technological Knowledge* (TK)**

Technological Knowledge (TK) refers to the ability to adapt to and use technology effectively in the learning process, including understanding new technologies relevant to educational goals (Suyamto et al., 2020). Research shows that 79% of students across study programs perceive their lecturers as having high TK. This indicates that lecturers are proficient in using information technology for communication, data processing, and problem-solving. FPEB lecturers, as perceived by students, demonstrate TK by using LCD projectors in teaching, assigning tasks through email or LMS, using online resources such as YouTube and articles, and applying Microsoft Office in delivering materials.

***Pedagogical Knowledge* (PK)**

Pedagogical Knowledge (PK) is a teacher's understanding of classroom management, teaching methods, evaluations, learning aids, and facilitating student learning to achieve learning objectives (Moreno et al., 2019; Schmidt et al., 2009). Research shows that 51% of students across study programs perceive their lecturers as having high PK. This indicates that lecturers understand teaching processes, classroom management, lesson planning, and student assessment, allowing them to perform their professional duties effectively. FPEB lecturers, as perceived by students, demonstrate PK by using varied teaching techniques to encourage discussion and independent learning, promoting active student participation, applying engaging methods suited to the material, and providing opportunities for students to develop new ideas and concepts.

***Content Knowledge* (CK)**

Content Knowledge (CK) is a teacher's understanding of the material or concepts to be taught (Schmidt et al., 2009). In this study, CK was measured using a questionnaire with three items. Research shows that 94% of students perceive their lecturers' CK as moderate. Lecturers need CK to understand their subject matter deeply and comprehensively, ensuring they can teach effectively. FPEB lecturers, as perceived by students, have a good understanding of the material and explain it clearly and systematically. However, their CK is sometimes not applied effectively, which may be due to factors such as teaching subjects outside their expertise or limitations in course assignments and credit distribution.

***Technological Content Knowledge* (TCK)**

Technological Content Knowledge (TCK) is the understanding of how technology and content interact to present teaching material effectively (Koehler & Mishra, 2009; Schmidt et al., 2009). Research shows that 49% of students perceive their lecturers' TCK as high. Lecturers need TCK to understand both the subject matter and

how technology can enhance or modify it. FPEB lecturers, as perceived by students, have TCK but do not always apply it effectively. For example, videos or other technological aids are rarely used, and PowerPoint presentations are often not engaging, making it harder for students to understand the material.

***Pedagogical Content Knowledge* (PCK)**

Pedagogical Content Knowledge (PCK) refers to understanding the best teaching methods to deliver material effectively (Koehler & Mishra, 2009). Research shows that 76% of students perceive their lecturers' PCK as moderate. Lecturers need PCK to transform subject matter into teaching, interpret content, choose suitable techniques, and design learning materials. FPEB lecturers, as perceived by students, have PCK but do not always apply it effectively. For instance, assignments or exercises are rarely given to enhance student understanding, and some exam questions are not well aligned with student abilities or the material context.

2. Multiple Linear Regression Analysis Test

Multiple linear regression equation analysis aims to determine the effect of *Technological Pedagogical Content Knowledge* (TPACK), which includes *Technological Knowledge* (TK)*, Pedagogical Knowledge* (PK)*, Content Knowledge* (CK)*, Technological Content Knowledge* (TCK), and *Pedagogical Content Knowledge* (PCK) on Student Achievement Index. The regression equation is as follows:

$$Y = b0 + b1X1 + b2X2 + b3X3 + b4X4 + b5X5 + e$$

Based on the data processing results, the regression coefficient model of variable X on Y is as follows:

Table 3. Multiple Regression Analysis Results

Variable	Coefficient	t-Statistic
Constant	-0.148	-0.293
Technological Knowledge	1.061	65.716
Pedagogical Knowledge	1,020	73,543
Content Knowledge	1,359	47,868
Technological Content Knowledge	0.922	37,014
Pedagogical Content Knowledge	1,029	49,307

Source: Processed Data

From the test results shown in Table 1.3, it can be seen that the results of the multiple linear regression test related to variables that greatly influence TPACK are:

$$Y = -0.148 + 1.061\ X_1 + 1.020X_2 + 1.359X_3 + 0.922X_4 + 1.029X_5 + e$$

From the above equation, it can be seen that:

1. The constant value of -0.148 indicates that when all independent variables (TK, PK, CK, TCK, and PCK) are zero, the TPACK score is -0.148.
2. The regression coefficient for Technological Knowledge (TK) is 1.061, showing a positive effect. This means that a one-unit increase in TK will raise the TPACK score by 1.061 units, assuming other variables remain constant.
3. The regression coefficient for Pedagogical Knowledge (PK) is 1.020, meaning that a one-unit increase in PK will increase the TPACK score by 1.020 units, holding other variables constant.
4. The regression coefficient for Content Knowledge (CK) is 1.359, indicating that a one-unit increase in CK will raise the TPACK score by 1.359 units, assuming other variables remain unchanged.
5. The regression coefficient for Technological Content Knowledge (TCK) is 0.922, meaning that a one-unit increase in TCK will increase the TPACK score by 0.922 units, with other variables held constant.
6. The regression coefficient for Pedagogical Content Knowledge (PCK) is 1.029, showing that a one-unit increase in PCK will raise the TPACK score by 1.029 units, assuming other variables remain constant.

3. Partial Hypothesis Testing

The results of the partial testing in this study are as follows:

Table 4. Partial Hypothesis Testing

Variable	Test Results
	Sign.
Technological Knowledge	0
Pedagogical Knowledge	0
Content Knowledge	0
Technological Content Knowledge	0
Pedagogical Content Knowledge	0

Source: Appendix (processed data)

Based on Table 1.4, the Technological Knowledge (TK) variable has a t-value of 65.716 > 1.968 and a significance of 0.000 < 0.05. This means Ho is rejected and Ha is accepted, indicating that TK has a significant effect on the Student Achievement Index. Therefore, Technological Knowledge (TK) influences the TPACK of lecturers at the Faculty of Economics and Business Education (FPEB).

The Pedagogical Knowledge (PK) variable has a t-value of 73.543 > 1.968 with a significance of 0.000 < 0.05, indicating that PK significantly affects TPACK. Therefore, PK influences the TPACK of lecturers at the Faculty of Economics and Business Education (FPEB).

The Content Knowledge (CK) variable has a t-value of 47.868 > 1.968 and a significance of 0.000 < 0.05, showing that CK significantly affects TPACK. Thus, CK influences lecturers' TPACK at FPEB.

The Technological Content Knowledge (TCK) variable has a t-value of 37.014 > 1.968 with a significance of 0.000 < 0.05, indicating a significant effect on TPACK. Similarly, the Pedagogical Content Knowledge (PCK) variable has a t-value of 49.307 > 1.968 and a significance of 0.000 < 0.05, showing it also significantly affects TPACK. Therefore, both TCK and PCK influence the TPACK of lecturers at FPEB.

DISCUSSION

The knowledge that strongly influences lecturers TPACK focuses on two key elements: Technological Knowledge (TK) and Pedagogical Knowledge (PK). Both are essential in enhancing TPACK because they enable lecturers to effectively integrate technology into the learning process. Technological knowledge refers to lecturers understanding of various technological tools such as software, hardware, online platforms, and digital media and their ability to select, use, and evaluate technologies relevant to the learning material. With strong technological knowledge, lecturers can identify appropriate technologies to support teaching, such as e-learning platforms or interactive multimedia, which enhance flexibility and efficiency in the teaching and learning process.

Pedagogical knowledge, on the other hand, refers to lecturers understanding of effective teaching methods, classroom management, learning design, and assessment of student outcomes. Lecturers with strong pedagogical knowledge can strategically plan how to use technology to meet learning needs, applying approaches such as collaborative, project-based, or problem-based learning. This integration ensures that technology becomes an integral part of learning strategies rather than merely a supporting tool. Pedagogical knowledge also allows lecturers to accommodate various student learning styles visual, auditory, or kinesthetic and utilize technology to deliver accessible and engaging materials, such as videos, infographics, or podcasts.

Technological and pedagogical knowledge interact dynamically within the TPACK framework (Mishra & Koehler, 2006), ensuring that technology use aligns with sound teaching principles. This interaction allows lecturers to create innovative learning environments through tools like online discussion forums, Learning Management Systems (LMS), and virtual simulations. However, successful integration also requires strong Content Knowledge (CK), which provides a deep understanding of the subject matter. Content knowledge forms the foundation for selecting appropriate technologies and pedagogical strategies, enabling holistic integration of the three TPACK components technology, pedagogy, and content. Lecturers with strong content mastery can better identify learning challenges, apply effective technological solutions, and ultimately enhance the quality of education.

CONCLUSION

The use of technology in teaching must be based on the suitability of the subject matter, learning methods, and student needs. The right technology helps lecturers deliver material more effectively, increase student participation, and facilitate more flexible and personalized learning. Thus, good technology integration will result in improved education quality, efficient learning management, and more optimal learning outcomes.

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