

Analysing Indonesian lecturers' adaptation in online teaching

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Abstract - This study examines Indonesian lecturers' perceptions of TPACK in an online learning environment during the pandemic, focusing on the interrelationships among its components. A quantitative research approach with a survey design was employed, involving 171 lecturers from private higher education institutions in Jambi. Data were collected through structured questionnaires assessing the seven components of TPACK: technological knowledge (TK), pedagogical knowledge (PK), content knowledge (CK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), pedagogical content knowledge (PCK), and overall TPACK integration. Structural Equation Modelling (SEM) was used to analyse the hypothesized relationships among these components. The findings reveal significant positive correlations between all TPACK components, emphasizing their interdependent role in online instruction. This research contributes to educational technology discourse by providing insights into TPACK's practical application during the pandemic. Further studies should explore long-term strategies for incorporating TPACK into evolving digital education frameworks.

Keywords: TPACK, online teaching, higher education, digital learning, Structural Equation Modelling

1. Introduction

The Covid-19 pandemic significantly disrupted education systems worldwide, transforming the teaching and learning process from traditional face-to-face methods to online platforms. In Indonesia, the shift to virtual classrooms was expedited by government mandates aimed at curbing the spread of the virus within educational institutions and surrounding communities. This transition posed a substantial challenge for lecturers, particularly in private higher education institutions, as they were required to adapt to online learning environments rapidly.

Online learning, a subset of distance education, focuses on providing educational experiences that are flexible in time and location (Anderson, 2011). The sudden adoption of this modality during the pandemic underscored the importance of equipping lecturers with the necessary technological, pedagogical, and content knowledge to facilitate effective teaching. One framework that addresses this need is Technological Pedagogical Content Knowledge (TPACK). As defined by Mishra and Koehler (2006), TPACK represents the integration of three core components: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK), as well as their intersections. Understanding how lecturers perceive and apply TPACK in their teaching practices is essential for navigating the



complexities of online education. Collectively, these studies provide a nuanced understanding of TPACK's role in modern education, emphasizing its importance while revealing gaps in scope and applicability that future research should address. The primary research questions guiding this study are: (1) How do lecturers perceive their TPACK competencies in the context of online teaching during the Covid-19 pandemic? (2) What are the interrelationships among the TPACK components in online teaching? (3) What professional development needs emerge from lecturers' experiences with online teaching?

The objectives of the study are to: (1) Examine lecturers' perceptions of their TPACK competencies. (2) Analyse the interconnections among TPACK components in online education. (3) Identify professional development strategies to enhance TPACK competencies.

2. Method

This study adopted a **quantitative research design** to explore the relationship between lecturers' Technological Pedagogical Content Knowledge (TPACK) levels and their teaching performance during online learning amidst the COVID-19 pandemic. Specifically, the study followed a **correlational design**, which, according to Creswell (2011), is suited for investigating the association among variables without manipulating them. The purpose was to assess how TPACK components interrelate and contribute to effective teaching in a virtual environment.

The research was conducted over a three-month period, from **April to June 2021**, focusing on lecturers from private higher education institutions in **Jambi City, Indonesia**. This timeframe was chosen to align with the heightened adoption of online learning due to the pandemic.

The population for this study consisted of all lecturers in private colleges within Jambi City. To ensure representativeness and feasibility, a **purposive sampling technique** was employed. This approach, as Patton (2002) suggests, involves selecting participants who meet specific inclusion criteria relevant to the research objectives. The sample comprised **171 lecturers** (n=171) who participated in the survey voluntarily and were willing to complete the questionnaire.

Purposive sampling was deemed appropriate for this study because it allowed for the selection of participants with direct experience in online teaching, ensuring the collection of relevant data.

Data collection was conducted using a **self-assessment questionnaire** adapted from the TPACK framework proposed by Schmidt et al. (2009). The TPACK model identifies seven key components of teaching knowledge:

PLS-SEM was utilized to (1) Assess the reliability and validity of the measurement model. (2) Test the hypothesized relationships among the TPACK components. The decision to use PLS-SEM was further supported by recommendations from Henseler et al. (2016; cf. Henseler, 2017), who highlighted its efficacy in educational research.

3. Results and Discussion

The analysis revealed significant positive relationships among all TPACK components, confirming the interdependent nature of the framework. Technology Knowledge (TK) was identified as a critical foundation for integrating technological tools into teaching practices. Lecturers with strong TK were more likely to utilize innovative technologies to enhance their online teaching practices. This finding aligns with previous research by Koehler et al. (2013), which highlighted the importance of technological fluency in facilitating effective online education. TK enables lecturers to explore and implement digital tools such as video conferencing platforms, learning management systems, and interactive applications, fostering student engagement and improving the overall learning experience.

The study highlights the interplay among TPK, TCK, and PCK as crucial for designing and delivering engaging online learning experiences. These components collectively enable lecturers to adapt to the demands of online education, ensuring that students receive a holistic and effective learning experience. This interdependence underscores the need for

comprehensive professional development programs that address all facets of TPACK. Such programs should focus on enhancing lecturers' technological fluency, pedagogical innovation, and content expertise to equip them for the challenges of modern education.

3.2 Discussion

Policymakers have a crucial role in creating an enabling environment for the adoption of TPACK in higher education.

The findings of this study underscore the transformative potential of TPACK in the realm of online education. By investing in targeted training programs, institutions can equip lecturers with the skills needed to navigate the challenges of online teaching. Moreover, a robust infrastructure, supportive policies, and a culture of continuous learning are essential for sustaining these efforts.

For educators, the study highlights the importance of embracing technology as an integral part of teaching. By developing competencies in TK, PK, and CK, lecturers can create dynamic and engaging learning environments that meet the needs of today's students. Institutions, on the other hand, must act as facilitators, providing the resources and support needed to foster innovation in teaching practices. Policymakers have a unique opportunity to drive systemic change by creating a conducive environment for TPACK integration. By establishing clear guidelines, allocating funding, and promoting collaboration, they can help ensure that higher education in Indonesia remains resilient and responsive to future challenges. Ultimately, the lessons learned during the Covid-19 pandemic provide a valuable foundation for reimagining education in a post-pandemic world. By embracing the TPACK framework and its components, stakeholders can work together to build an educational system that is both technologically advanced and pedagogically sound.

4. Conclusion

The Covid-19 pandemic has profoundly transformed the educational landscape, prompting an unprecedented shift from traditional in-person instruction to online learning modalities. This transformation has emphasized the crucial role of Technological Pedagogical Content Knowledge (TPACK) in enabling lecturers to navigate these changes effectively. The findings of this study reveal significant positive relationships among all TPACK components, confirming the interdependent nature of the framework and its pivotal role in fostering effective online education.

Technology Knowledge (TK) serves as the foundation of the TPACK framework, enabling lecturers to integrate diverse technological tools into their teaching practices. This study highlights how TK, when combined with Content Knowledge (CK) and Pedagogical Knowledge (PK), forms a robust basis for creating meaningful and engaging online learning experiences. CK ensures the relevance and accuracy of the subject matter, while PK provides the pedagogical strategies needed to facilitate learning. Together, these components create a comprehensive approach to addressing the unique challenges posed by the transition to online education.

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