



Analyze Variable TPACK (Technological, Pedagogical, and Content Knowledge) in Digital Learning: A Review

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Abstract

In particular, the Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), and Technological Content Knowledge (TCK) variables are the focus of this study, which attempts to ascertain the relationship between them. and Knowledge of Technological Pedagogical Content (TPACK). The Preferred Reporting Items for A review method used in this study. The study's findings that the TK on TCK, TK on TPK, TK on TPACK, and TPK on TPACK have a positive influence on each other. However, two relationships—the CK on TPACK and the PK variable on TPACK—do not have a positive or significant effect. Ten of the twelve hypothesized variables have a positive influence, while the other two have no discernible effect. It is intended that the research would improve teachers' TPACK skills, particularly in pedagogical and subject knowledge. Tags: Guru skills, TPACK, SmartPls

Keywords: TPACK, SmartPls, Teacher Competence

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Introduction

These days, the potential of a nation or country is determined by its human resources, which are developed via education, rather than by the quantity of natural riches. (Darling-Hammond et al., 2020). assert that to raise people's standard of living, education is necessary, and educators must meet

these demands. If the instructors hold themselves to a standard that matches their level of ability, then the students' educational requirements will be satisfied. Teachers in the twenty-first century need to be proficient with a variety of technology tools (Ng et al., 2023). Teachers must possess the skills to integrate technology, pedagogical understanding, and content to effectively address the technological advancements in 21st-century education. TPACK is the term for this blending of technology, pedagogy, and content.

(Hansen et al., 2016) coined the term "pedagogical content knowledge" and initially promoted a PCK framework that concentrates on building good learning and necessary components. According to him, PCK is the comprehension of how concepts and approaches in a specific field of study are perceived and interpreted incorrectly. The comprehension of the subject matter to be taught (content knowledge) and the knowledge of how to teach (pedagogical knowledge) combine to form PCK, which is defined as a necessary skill for any teacher. (Class, 2024), developed the TPACK framework based on the Shulman PCK framework. The Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical and Content Knowledge (TPACK) Framework are the results of combining the three (3) basic knowledge sets to create new knowledge (Schmid et al., 2020); (Giannakos et al., 2015); (Jiménez Sierra et al., 2023). According to (Panakaje et al., 2024); (Haleem et al., 2022), TPACK is the thorough integration of pedagogy, material knowledge, and skills with technological advancements. Comparing TPACK to PCK, the prior concept reveals advantages. These include creating curriculums, assessment systems, learning models and techniques, and instructional designs—all of which are technologically integrated (Ndongfack, 2015).

Finding the relationship between the CK (Content Knowledge), PCK (Pedagogical Content Knowledge), TCK (Technological Content Knowledge), and TPACK (Technological Pedagogical and Content Knowledge) variables was the aim of this study. Effect of TK (Technological Pedagogical) on TPK (Technological Pedagogical Knowledge), TCK (Technological Content Knowledge), and TPACK (Technological Pedagogical and Content Knowledge) are some examples of the terms used in this research. The relationship between TPACK (Technological Pedagogical and Content Knowledge) and the variables TPK (Technological Pedagogical Knowledge), PCK (Pedagogical Content Knowledge), and TCK (Technological Content Knowledge).

Methodology

A review should take into account certain factors. This study will primarily concentrate on the following topics: Examining Variant Test of Determination Analysis (review), which contributes to the foundation of our evaluation. First, using a few carefully chosen keywords, we gathered the most recent research on the use of TPACK, SmartPLS, and Teacher Competence. Other than that, we restricted the kind of literature to only books published in conferences and journals.

Results and Discussion

Examining Variant Test of Determination Analysis

Details regarding the PCK, TCK, TPK, and TPACK variables' R-Square values. The PCK construct's R-square value, as determined by the R-square value, is 0.613. This indicates that the PK and CK constructs account for 61.3% of the variation of the PCK construct, with other model variables accounting for the remaining 38.7%. The R-square value of the TCK construct is 0.458. This shows that the TK and CK constructs account for 45.8% of the variation of the TCK construct, whereas variables outside the model account for 54.2% of the variance. The TPK construct's R-square value is 0.355, meaning that the TK and PK constructs may account for 35.5% of its variation, while other factors outside the model account for 64.5%. The R-square value of the TPACK construct is 0.493. This indicates that the TK, PK, CK, TCK, PCK, and TPK constructs may account for 49.3% of the variance for the TPACK construct, with the remaining 50.7% of the variance being explained

by variables not included in the model. The bootstrap process is used to obtain the path coefficient value for the significance level. The t-statistical value that is produced from this is compared to the t-table value.

Technological knowledge positively affects both technological pedagogy and content knowledge (Li et al., 2022); (Santos & Castro, 2021); (Yildiz & Arpaci, 2024); (Agustini et al., 2019). The technological pedagogical knowledge variable, which positively affects both technological pedagogical and content knowledge, is tested by the twelfth hypothesis. The t-statistic value of 3.857 is displayed in the test results. The twelfth hypothesis is accepted based on this result, which indicates that the t-statistic is significant because it is >1.96 with a p-value <0.05 . This demonstrates the favorable relationship between Technological Pedagogical and Content Knowledge and Technological Pedagogical Knowledge. Despite its high level, the CK ability has little direct impact on the TPACK ability. If content knowledge is used to use its PCK and TCK capabilities, then it will impact TPACK. These findings contrast significantly, ly from those of a study by (Ning et al., 2024) which found that teacher TPACK is impacted both directly and indirectly by the CK, PK, and PCK components.

(Von Kotzebue, 2022); (Zhang, 2021) also reported a high result, stating that the average TPACK profile of elementary school teachers in Semarang Regency was fairly high, despite other characteristics being low, specifically the TPK and PCK. It was discovered that the TK component had a direct impact on the TPACK based on the results of the model hypothesis test. The TPACK capacity is not directly impacted by the CK and PK components (Deng et al., 2023). When creating TPACK, the analysis's findings might serve as a foundation. It is impossible to increase TPACK capability on its own. It is limited to enhancing one's technology proficiency, subject understanding, pedagogical knowledge, or knowledge of content. However, it needs to be done concurrently (Adipat, 2021). (Hsu et al., 2021); examined the TPACK of elementary school teachers that while the TPACK was excellent, it could not be applied in the classroom. This indicates that the teacher's understanding of TPACK is already adequate, but it still needs to be enhanced during the classroom implementation process to make it even more relevant for bolstering the TPACK evaluation, which includes a performance assessment.

Conclusion

The components with the highest percentage scores are CK and TCK, whereas the components with the lowest percentage scores are TK and TPK. relationship variables—of which twelve have a direct relationship with other variables—have been investigated. Ten of the twelve direct variables are positively correlated and significantly affect each other. These are the following relationships: 1) $PCK \square TPACK$; 2) $CK \square PCK$; 3) $CK \{ TCK$; 4) $TCK \square TPACK$; 5) $PK \{ PCK$; 6) $PK \{ TPK$; 7) $TK \square TPACK$; 8) $TK \square TCK$; 9) $TK \{ TPK$; 10) $TPK \{ TPACK$.

Conflicts of Interest

No Conflicts of Interest

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