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Relationship among School Support, Technological Pedagogical Content Knowledge (TPACK) and Technostress among Kindergarten Teachers in Selangor

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Abstract

The primary objective of this study is to study the relationship of school support, technological pedagogical content knowledge (TPACK), and technostress among kindergarten teachers in Selangor. A quantitative approach along with a survey design was used in this study, involving 739 kindergarten teachers in Selangor. Structural Equation Modeling (SEM) was used to examine the path relationships. Questionnaires on school support, technostress, and TPACK were utilized. The results indicated that school support has a significant negative relationship with technostress (β= -0.274, P=0.000); school support has a significant positive relationship with TPACK (β= 0.512, P=0.000); and TPACK has a significant negative relationship with technostress (β= -0.725, P=0.000). In conclusion, the findings of the study imply that school support, and TPACK model can reduce technostress among kindergarten teachers. Besides contributing to the theory and preschool principal in planning ways to address technostress.

Keywords: School Support, TPACK, Technostress

Introduction

Kindergarten teacher face significant challenges in integrating technology meaningfully into their teaching due to a lack of digital competencies, limited time for professional development, and the negative impact of technostress (Otterborn, Schönborn & Hultén, 2019; Romijn, Slot & Leseman, 2021; Kim & Lee, 2021). Many kindergarten teachers do not possess adequate knowledge or skills to plan and implement developmentally appropriate uses of technology for young children (Falloon, 2020; Ogegbo & Aina, 2020). These challenges are further compounded by the demanding nature of their roles, which restricts opportunities for ongoing professional learning (Bowman et al., 2022; Costan et al., 2021). While previous research has focused on general barriers, there is still a significant lack of studies that look at effective ways to help early childhood educators overcome these issues and improve the use of technology in early learning environments.

A significant challenge in early childhood education is the insufficient Technological Pedagogical Content Knowledge (TPACK) among kindergarten teacher an essential integration of pedagogical, content, and technological expertise required for effective technology integration in teaching (Luo et al., 2023; Tzavara & Komis, 2023). Many kindergarten teacher face difficulties in developing TPACK competencies, impeding their ability to design technology-enhanced curricula that align with pedagogical objectives, content standards, and young children's developmental needs (Ogegbo & Aina, 2020; Hong, Zhang, & Liu, 2021). This gap restricts their capacity to leverage technology for increasing engagement, facilitating play-based learning, and promoting holistic development (Karchmer-Klein & Konishi, 2023; Tseng et al., 2022). Despite acknowledging TPACK's importance, few studies have explored how early childhood educators can effectively cultivate and apply TPACK in practice, particularly within developmentally appropriate frameworks.

Integrating technology in early childhood education is uniquely challenging. Kindergarten teacher often receives little institutional support. They also experience high levels of technostress (Peleg & Levy, 2024; Kim & Lee, 2021). Without proper school resources support, kindergarten teacher struggle to use technology in ways that suit young learners (Solís, Lago-Urbano & Real Castelao, 2023). Previous research recognizes these difficulties. However, few studies explore how improving TPACK can reduce the technostress. Higher TPACK level may reduce stress and support better technology use in early childhood classrooms (Özgür, 2020).

Structural Equation Modeling (SEM) is a suitable approach for this study as it examines both direct and indirect relationships between variables (Dong et al., 2020). SEM allows for the analysis of how school support influences TPACK, and technostress among kindergarten teacher (Özgür, 2020). It also enables the examination of the link between TPACK and technostress, highlighting how TPACK can reduce stress levels. Despite its potential, few studies in early childhood education have employed SEM to explore these interconnected factors, revealing a gap in understanding how support systems and teacher competencies jointly affect technology integration and stress management.

Research Objectives

In this study, the researcher intends to achieve the following objectives:

To examine the relationship between school support, technological pedagogical content knowledge (TPACK), and technostress.

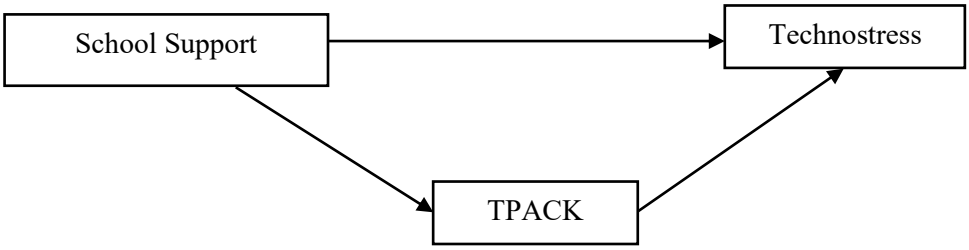
Research Questions

Does school support have a significant relationship with technostress?

Does school support have a significant relationship with Technological Pedagogical Content Knowledge (TPACK)?

Does TPACK have a significant relationship with technostress?

Research Framework



School support is examined through the lens of the Person-Environment Fit Theory (Edwards et al., 1998), which provides a foundation for understanding the factors influencing technostress. The Technological Pedagogical Content Knowledge (TPACK) model by Koehler and Mishra (2009) is employed to represent the knowledge variable, given its relevance and dynamic application in studies of technology integration in teaching. Additionally, the Transactional Theory of Stress (Lazarus & Folkman, 1984) explains stress as a result of the interaction between an individual and their environment, wherein the individual appraises the situation as potentially harmful to their well-being.

Literature Review

School Support

School support is essential for successful technology integration in education. Research indicates that classrooms must be adequately equipped with Information and Communications Technology (ICT) hardware to facilitate technology adoption (Yang, 2022). Beyond infrastructure, teacher accessibility and engagement with technology significantly influence their ICT proficiency (Yang & Hong, 2022). Access to digital resources and reliable infrastructure enables educators to maximize technological tools for instructional purposes (Yang, 2022). A teacher's capacity to navigate and utilize digital information effectively serves as an indicator of their overall ICT competence.

Research demonstrates that comprehensive school support including infrastructure, administrative management, and professional training, is essential for effective classroom technology implementation (Nikolopoulou, 2020). This support directly influences teachers' attitudes toward technology adoption. School support and peer collaboration show particularly strong correlations with increased technology use (Dong et al., 2020). Additionally, positive technological attitudes combined with school support significantly reduce teachers' technostress (Özgür, 2020). These findings emphasize the critical role of supportive school support in facilitating technology integration in early childhood education.

Technological Pedagogical Content Knowledge (TPACK)

Mishra and Koehler (2006) introduced the Technological Pedagogical Content Knowledge (TPACK) framework as a theoretical model. However, only a few researchers have tested its components through empirical studies (Schmid, Brianza, & Petko, 2021). Some studies have used Structural Equation Modeling (SEM) to explore the relationships between TPACK domains. Yet, the results are mixed and still debated (Dong et al., 2015). Due to these inconsistencies, Koehler et al. (2012) highlighted the importance of reviewing how TPACK is measured. They stressed the need to improve the instrument's validity and reliability. In a

similar effort, Angeli and Valanides (2009) and Jin (2019) studied the psychometric aspects of TPACK. Each study used a different method, depending on its specific research goal.

Previous research has pointed out a lack of focus on specific subject areas and contextual factors within the TPACK framework (Chai, Rahmawati & Jong, 2020; Aktaş & Özmen, 2020). Most of the studies have concentrated on general or broad educational settings. Very few research have explored how TPACK applies to specific teaching contexts. In particular, there is limited research on TPACK among preschool teachers. Most existing studies focus on primary and secondary school educators (Paidican & Arredondo, 2022; Wu et al., 2022; Gozum & Demir, 2021). This lack of attention highlights a clear gap in the literature. There is a strong need for more empirical studies in early childhood education settings. Researchers should explore how TPACK is applied and developed in preschool classrooms.

Technostress

Stress is a natural part of human life. Previous studies have explored how organizational factors and school support relate to psychological stress. These factors are often linked to technostress in the workplace (Magistra, Santosa & Indriayu, 2021; Chou & Chou, 2021). In schools, recent research shows a clear link between increased technology use and higher levels of stress among teachers (Dong et al., 2020; Özgür, 2020). As technology becomes more common in education, many teachers feel overwhelmed. However, some factors can help ease this pressure. School support and TPACK have been identified as possible protective elements. These supports may help reduce the negative impact of technology use on teacher stress.

Previous research on technology integration in education indicates that limited training, insufficient infrastructure, and inadequate support from school leadership and colleagues hinder effective technology use in teaching (Dong & Mertala, 2021; Dong et al., 2020). Ozgur (2020) highlights that technostress arises from psychological and physical strain, including anxiety and tension associated with technology use.

Khlaif et al. (2023) investigated factors contributing to technostress among teachers integrating new technologies in the classroom. Their study revealed that insufficient school support and low levels of teacher professionalism heighten technostress, whereas peer support plays a mitigating role. The study highlights a research gap, noting that few investigations have focused specifically on the determinants of technostress among teachers. Most prior research emphasized general technology use or stress reduction strategies in secondary education. Further exploration is necessary to inform effective integration of technology in teaching.

Similarly, Califf and Brooks (2020) found that technostress adversely affects teaching quality among K–12 educators. Their study identified a negative association between technostress and classroom technology use. However, peer collaboration and knowledge sharing within schools were found to alleviate such stress. Addressing technostress is critical, as elevated stress levels may contribute to teacher attrition.

Methods

Research Design

This study uses a quantitative survey design to explore the relationships between school support, TPACK, and technostress among kindergarten teachers. A quantitative approach is suitable for this research because it relies on numerical data and statistical tools. This helps to explain and understand the connections between the variables in a clear and measurable way (Creswell, 2011). Using this method allows the findings to be based on objective data. It also supports a more structured and systematic analysis of the issues being studied.

A survey design was chosen because it is an efficient way to collect a large amount of data in a short time (Babbie, Halley & Zaino, 2007). Surveys are useful for reaching many respondents at once. This helps provide a broader and more complete picture of the research problem (McMillan, 2006). It also allows the researcher to identify patterns and relationships across a wide group of participants. As a result, the findings can be more easily generalized to the larger population of preschool teachers.

Samples and Sampling

Sampling is the process of selecting a group of individuals from a larger population to represent that population in a study (Mohd Majid Konting, 1993). A sample refers to a part of the population, not the whole, and is used to draw conclusions about the entire group (Verma & Verma, 2020). This study used both stratified random sampling and simple random sampling. Stratified random sampling is a useful method when the population is not evenly spread across different groups (Chua, 2014). In this study, the sample was divided based on districts in the state of Selangor. After creating these strata, simple random sampling was applied. This method gives every individual in the population an equal chance of being selected. Using both methods helps ensure that the data is more representative and reliable. A total of 739 kindergarten teacher participants in this study.

Instrumentation

Following the literature review, the researcher adapted the questionnaire on school support, computer self-efficacy, and technological stress developed by Dong et al. (2020). The questionnaire consists of 18 items distributed across three constructs: school support (7 items), and technostress (11 items).

For the TPACK construct, the researcher adapted a questionnaire developed by Schmidt et al. (2009). The questionnaire serves as the basis for measuring the Technological Pedagogical Content Knowledge (TPACK) variable in this study. The instrument consists of 67 items designed to assess seven key components of TPACK: Technological Knowledge (TK), Content Knowledge (CK), Pedagogical Knowledge (PK), Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical Content Knowledge (TPACK).

Analysis

Normality Assessment

To check if all variables were normally distributed, the researcher looked at the skewness and kurtosis values for each variable. This was done based on the guidelines provided by Joanes and Gill (1998). A variable is considered to have an approximately normal distribution when

both skewness and kurtosis values fall between -2 and +2 (Blanca et al., 2013). In this study, the values for each variable are presented to show whether they meet this condition.

Table 1
Skewness and Kurtosis Values for Each Variable

Variable	Skewness	Kurtosis
School Support	-.458	.837
TPACK	-.031	-.533
Technostress	-.236	-.635

Results

Table 2
Regression Coefficient Path and Significance Values

			Estimate(β)	S.E.	C.R.	P
TPACK	←	School Support	.512	.031	16.544	***
Technostress	←	School Support	-.274	.039	-6.995	***
Technostress	←	TPACK	-.725	.057	-12.779	***

Table 2 showed the finding to answer all the research questions.

RQ1: Does school support have a significant relationship with technostress?
In this study, the researcher reports the findings of the path analysis involving two variables. The results reveal a negative and significant relationship between technostress and TPACK, with a β value of -0.274, and $p < 0.05$. This suggests that as school support levels increase, the level of technostress experienced by preschool teachers tends to decrease.

***RQ2*:** Does school support have a significant relationship with Technological Pedagogical Content Knowledge (TPACK)?
In this study, the researcher reports the findings of the path analysis for two variables. The analysis reveals a positive and significant relationship between Technological Pedagogical Content Knowledge (TPACK) and school support, with a β value of 0.512 and $p < 0.05$. This indicates that greater school support is associated with higher levels of TPACK among preschool teachers.

RQ3: Does TPACK have a significant relationship with technostress?
In this study, the researcher reports the findings of the path analysis involving two variables. The results show a negative and significant relationship between technostress and TPACK, with a β value of -0.725 and $p < 0.05$. This indicates that higher levels of TPACK are associated with lower levels of technostress among preschool teachers.

Discussion of Study

This study found a significant negative relationship between school support and technostress. This means that higher levels of school support can help lower the stress of kindergarten teachers feel when using technology. This result aligns with findings from Dong et al. (2020) and Joo et al. (2016), who also reported that school support plays a key role in reducing teacher stress. Fernández-Batanero et al. (2021) further explained that specific types of

support such as training sessions, access to technological tools, and skill-building workshops. It can help reduce the impact of technostress. When teachers receive this kind of support, they are better prepared to handle technology-related challenges in the classroom.

In this context, creating a supportive teaching environment is essential. Access to tools like computers, projectors, televisions, mobile apps, and reliable internet in every classroom can greatly reduce the technological stress faced by teachers. A study by Konca and Erden (2021) showed that teachers often use computers (66.5%), televisions (57.5%), the Internet (54.5%), and projectors (35.9%) in their lessons. This highlights the importance of having proper technological infrastructure in the classroom use.

Beyond physical resources, support from the school in the form of technical help and peer collaboration is also vital. Khlaif et al. (2023) found that technical and social support from colleagues can ease stress by helping teachers solve everyday technology related problems. This shows the value of a well-rounded support system. Schools should provide not only the right tools but also meaningful interpersonal support to build teacher confidence and reduce stress when using technology in the classroom.

The findings of this study show a positive and significant relationship between school support and TPACK. This means that strong school support can help improve TPACK levels among kindergarten teachers (Dong et al., 2020). This result is consistent with the findings of Davaasuren et al. (2021), who also reported a similar positive link between school support and TPACK.

These results highlight the important role school support plays in helping teachers integrate technology into teaching. Support from the school such as providing access to digital tools and offering technical help makes it easier for teachers to use technology in the classroom. Likewise, Van Den Beemt et al. (2020) found that school support not only improves teachers' TPACK but also builds their confidence in using technology effectively. Al-Mamary (2022) highlighted that technical support from schools plays a key role in shaping teachers' willingness to use technology. When teachers receive strong school support, their TPACK levels tend to increase. This reinforces the importance of a supportive school environment in building teachers' technological skills.

The positive link between school support and TPACK also points to the critical role of mentorship in enhancing teachers' technology use. Baser et al. (2021) found that collaboration between mentors and mentees helps address specific needs, such as providing teaching aids and strengthening content knowledge. Parker et al. (2021) added that mentoring during lesson planning and implementation can boost teachers' confidence in using technology.

School support offers more than just guidance. It also ensures that teachers have access to the resources they need. With the mentorship, teachers are better able to overcome challenges and apply technology effectively in the classroom. In early childhood education, mentorship plays a vital role in developing and strengthening TPACK, leading to more confident and capable use of technology in teaching.

The findings of this study show a significant negative relationship between TPACK and technostress among teachers. This means that teachers with higher TPACK levels tend to experience less stress when using technology. This result supports earlier research by Erdoğan and Akbaba (2022), who also found a similar negative correlation between TPACK and technological stress. Rahman et al. (2022) explained that TPACK is essential for helping teachers integrate technology effectively into their teaching. Chai, Hwee, and Teo (2019) also emphasized that strong TPACK allows teachers to create more meaningful learning experiences, which in turn helps reduce stress related to technology use. This negative relationship may be due to the increased competence and confidence found in teachers with strong TPACK. When teachers feel capable of using technology in their classrooms, they are less likely to feel anxious or overwhelmed. Bin Ali, Ahmad, and Ayyash (2021) supported this view by stating that technological competence increases teacher confidence and lowers the chances of experiencing technostress. Similarly, Çörekci et al. (2023) found that teachers with higher TPACK often have more positive attitudes toward technology, which further helps reduce stress.

The study by Khlaif et al. (2023) found that teachers with limited technological skills and heavy workloads in technology use are more likely to experience technological stress. This finding highlights the need to equip teachers with strong TPACK skills. Ongoing professional development is essential and should be supported by schools to build these competencies. Hill and Uribe-Florez (2020) also stressed that TPACK offers a solid foundation for meaningful technology integration. It helps ensure that technology is not just used as a tool, but as a way to improve teaching and enhance student learning.

These findings point to the importance of strengthening TPACK among teachers. Doing so can help reduce technological stress and support more confident, effective use of technology especially in early childhood education settings.

Recommendations

Theory

This study highlights that mastering the components of TPACK can significantly reduce the technostress teachers experience. When educators have strong knowledge in all three TPACK domains technology, content, and pedagogy. They are better prepared to use technology effectively in their teaching. This not only boosts their confidence but also lowers the stress that comes with using digital tools in the classroom. Teachers with strong TPACK can choose the right technologies and strategies to meet their teaching goals.

The findings emphasize the importance of strengthening TPACK to improve teachers' technological skills. A solid grasp of TPACK helps reduce the difficulties teachers face in technology integrated in the classroom. When teachers combine all three domains effectively, they can create more engaging and meaningful learning experiences.

This has important implications for the TPACK model. It shows that mastering TPACK not only improves teaching quality but also helps teachers manage the demands of technology in the classroom with less stress. Based on these findings, it is recommended that professional development programs focus on comprehensive TPACK training. Such programs

should support teachers in building integrated knowledge that enables them to teach confidently and effectively in today's digital learning environment.

Practice

The findings of this study can serve as a useful guide for preschool principals when planning school policies. Principals are encouraged to include structured technology training and reduce teacher workload as part of their school support efforts. Regular monitoring and follow-up actions are important to ensure that the plan is working effectively. A systematic control mechanism should also be in place to track and address technological stress in a more complete and organized way. It is also important to take a proactive approach. Principals need to be ready to face new challenges and plan for the long term. This will help ensure that strategies remain effective as technology demands continue to evolve. Such forward-thinking leadership and planning can empower teachers. It can also create a more supportive environment that helps reduce stress and improves overall teaching quality.

Recommendation

This study supports earlier findings that TPACK and school support are important factors in lowering technostress. However, this study adds a new perspective. It focuses on kindergarten teachers in Selangor while previous research mostly examined preschool teachers. In this context, shows the unique context and needs of early childhood educators. It also expands the relevance of earlier findings. Thus, the results are especially valuable in the local context and for in-service teachers.

Conclusion

This research examined the relationship between school support, TPACK, and technostress among kindergarten teachers in Selangor. The findings revealed that both school support and TPACK play a significant role in reducing technostress. When teachers receive strong support from school support, particularly from principals and teachers, their TPACK levels tend to increase, which in turn lowers their technostress. The results further indicate that higher levels of TPACK are associated with lower levels of technostress. These findings underscore the importance of enhancing school support and TPACK to facilitate effective technology integration in the classroom. Overall, this study highlights the need to reduce technostress among teachers while strengthening their technological, pedagogical, and content knowledge.

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