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Virtual Leadership and Teacher's Work Wellbeing: The Mediating Roles of Technostress

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Abstract

This study aims to assess the technostress as mediators in the relationship between virtual leadership and teacher's work wellbeing among primary school teachers in Sabah. This quantitative study involved 427 respondents among primary school teachers in Sabah. Analysis using Structural Equation Modelling (SEM) in IBM-SPSS-AMOS 24.0 software. This study found that technostress is a mediator in the relationship between virtual leadership and teacher's work wellbeing among teachers in Sabah. The findings of the study also found that all the direct and indirect paths are significant. It can be concluded that the type of mediation that occurs in this model is partial mediation. The study's findings can help policymakers improve the national education system by providing a clearer direction.

Introduction

In light of technological advancements in education, the field of education is adapting and understands the significance of improving teachers' well-being (Ghory & Ghafory, 2021; Bahtiar et al., 2020). Through the ICT Transformation Plan (ITP) 2019–2023, the government makes investments in ICT expansion in line with the goals of the Malaysian Education Blueprint (PPPM) (Ministry of Education Malaysia, 2013). (Malaysian Ministry of Education, 2019). According to Zhao (2020); Onyema (2020), the COVID-19 epidemic hastened the transition to digital infrastructure and had a substantial impact on education. A new paradigm in education was brought about by the emergence of online learning (Ahamad Bahtiar et al., 2020; Dirani et al., 2020). To keep up with these changes, virtual leadership using tools like Team, Zoom, or Google Meet is crucial (Harris & Jones, 2020).

Technology can be more flexible, productive, and efficient, but it can also be harmful to one's physical and mental health (Atanasoff & Venable, 2017; Alhumaid, 2019). Although properly used ICT by teachers can enhance student learning, it can also add to the workload and stress of teachers (Pinto & Leite, 2020; Tarus et al., 2015; Voet & De Wever, 2017). Technostress leads to increased stress levels and obstacles, which affects ICT implementation intentions (Joo et al., 2016; Pace et al., 2022). According to Bauwens et al. (2021), there is a dual effect of leadership, namely empowering leadership, on technostress. This includes lowering anxiety and boosting resources. Additionally, in the face of ICT-induced stress, leadership influences work satisfaction and weariness (Becker et al., 2020), emphasising its critical role in mitigating technostress and its effects.

In order to manage worker well-being, job happiness, and overall work results, virtual leadership research is crucial (Dilby and Farmanesh, 2023). Virtual leadership is becoming the preeminent leadership paradigm due to the necessity of using digital technology for effective remote team management, which fosters workplace creativity, innovation, and sustainability (Afshari et al., 2022). For virtual leaders to effectively lead in virtual settings, they must be able to adapt to changing circumstances. This requires the creation of new positions, such as the expert facilitation of technology usage (Bell et al., 2022). Globalisation and the digital revolution have made virtual leadership more crucial by bringing advantages like quicker communication and time savings but also posing problems with connectivity, motivation, and collaborator commitment (Cordova-buiza et al., 2022). Therefore, learning about virtual leadership is essential to comprehending the shift from analogue to virtual practises and the ensuing modifications to the dynamics of leadership within virtual work environments, like virtual schools, especially in the event of social unrest (Willermark & Islind, 2022).

Simultaneously, technostress research is essential given the huge implications for people and enterprises alike. A negative psychological state known as "technostress," which is brought on by using technology, can result in negative effects like anxiety, mental exhaustion, and lower productivity. Understanding technostress's consequences on health, work outcomes, and academic achievement requires a thorough understanding of the different factors that contribute to its onset. Numerous studies demonstrate the importance of both human and organisational factors in lowering technostress, emphasising the need to find strategies to reduce any unfavourable effects (Pirzada et al., 2022; Apriyanti et al., 2022; Borle et al., 2021). Studying technostress can help academics gain insight into effective management strategies, lessen its impact on individuals and organisations, and eventually improve performance, satisfaction, and well-being.

Furthermore, because there is a clear correlation between student well-being and quality of instruction, study on teacher well-being is essential. Teachers' professional wellbeing is negatively impacted by stress and burnout, which limits their capacity to function successfully (Nwoko et al., 2023). According to Sohail et al (2023), personal skills, socioemotional competence, reactions to work environments, and professional relationships are some of the elements that impact teachers' occupational wellbeing. To increase teacher well-being, it is essential to create a positive work environment free from bullying and marginalisation, as well as an environment of mutual support, respect, and inclusivity (Diana, 2022). Short-term remedies are less significant than long-term solutions that put teacher welfare first and are integrated into core teaching practises (Hartcher et al., 2022; Rasheed-

karim, 2022). For immediate instructional efficacy, staff retention, and career advancement inside educational institutions, it is critical to comprehend and address teacher well-being.

This study investigates the role that technostress plays as a mediator between virtual leadership and teacher job health. It is critical to acknowledge the challenges that educators confront as technology quickly transforms the nature of education. This study focuses on the stress that comes with using technology, offering useful information to lawmakers, educators, and schools. It acts as a guide for developing thoughtful strategies to reduce technology-related stress on teachers, promote more successful virtual leadership, and improve the well-being of educators. By concentrating on these elements, our research fills in knowledge gaps and provides a helpful guide for improving the welcome atmosphere in schools.

Research Objective

The objective of this study is to determine the role of technostress as a mediator in the relationship between virtual leadership and primary school teachers' work well-being in Sabah.

Literature Review

Virtual Leadership

Virtual leadership is defined as a leadership style that integrates the use of computers or mobile technology as an intermediary for task orientation, decision making and problem solving in organizations (Hinds & Kiesler, 1995; Lee, 2010) and it is different from traditional or conventional leadership styles. Avolio et al (2001) defined Virtual leadership can be defined as a social influence process that is facilitated by technology, aiming to bring about changes in attitudes, feelings, ideas, behaviours, and performance within individuals, groups, or organisations.

Teachers Work Wellbeing

Work wellbeing refers to the overall state of employees with regard to their health as well as their level of happiness and contentment in their working environment. It includes a person's physical and mental health, their social life, their job happiness, and their ability to balance their work and personal life. Well-being in the workplace is an important issue in organizational research because it has a significant impact on employee productivity, retention and overall organizational performance (Aryanti et al., 2020). Teacher well-being is divided into five dimensions, namely affective well-being, social well-being, professional well-being, cognitive well-being and psychosomatic well-being (Van Horn et al., 2004). Meanwhile, other researchers suggest the assessment of teachers' work related to well-being by using three dimensions, namely workload well-being, organizational well-being and student interaction well-being where work well-being is linked to problems related to workload and other related pressures. Organizational well-being is related to the teacher's perception of the school as an organization, including the perception of school leadership and culture towards teachers and teaching (Collie et al., 2015).

Technostress

The word "technostress" was initially introduced by Craig Brod in 1984, during the early 1980s. According to Brod, technostress is characterised as a psychological condition that individuals encounter when engaging with technology. The present psychological condition exerts an adverse influence on human attitudes, cognitive processes, behavioural patterns, and

psychological well-being, which can be traced back to the direct or indirect effects of technology. Technostress, characterised by a negative affective state, has been found to impede reaction time and disturb regular work habits. (Weil & Rosen, 1997).

Based on the context of technostress in the workplace, technostress is a negative psychological state associated with the use and misuse of technology and the threat of technology being used in the future. Technostress is also associated with a mismatch between job demands and technological resources in the workplace (Salanova et al. 2007, 2013). Negative psychology such as feelings of restlessness, mental fatigue, skepticism, ineffective beliefs, and addiction to technology.

The Relationship between Virtual Leadership and Technostress

Leadership affects technostress in many ways. Research has shown that empowering leadership can reduce technology stress and increase employee resources. The study's findings indicate that the implementation of an empowering leadership style, characterised by the promotion of autonomy and self-management, can effectively motivate people to mitigate technological stress (Bauwens et al., 2021). Furthermore, leadership was found to have an influence on job fatigue and job satisfaction in the context of stress caused by ICT (Becker et al., 2020). These findings suggest that leadership plays an important role in influencing technostress and its consequences. By examining the empowering role of leadership, this study contributes to an emerging line of research on workplace leadership related to ICT (Cortellazzo et al., 2019; Bartsch et al., 2021; Iannotta et al., 2020).

The relationship between Virtual Leadership and Teacher Wellbeing

Many studies conducted show that the whole type of leadership positively affects the well-being of employees (Nielsen & Taris, 2019). A healthy school climate is influenced by leadership that supports employees by providing opportunities for professional development, control, autonomy, meaningful communication, and opportunities for decision-making (Greany & Earley, 2021; Aelterman et al., 2007). Studies have also shown that school leadership affects teachers' well-being indirectly, by creating healthy, supportive and optimal conditions for functioning (Eyal & Roth, 2011; Gillet et al., 2012; Panaccio & Vandenberghe, 2009) rather than directly (Abdulaziz & Noman, 2021).

Research Methodology

The study focuses on primary school teachers in Sabah as the target population. The researchers employed a stratified sampling technique, in which a sample of 427 respondents was randomly selected from the sampling frame. The selected respondents were given a self-administered questionnaire by their school representatives or through email. The data were analysed using SEM procedure in IBM-SPSS-AMOS 24.0.

Result and Discussion

Confirmatory Factor Analysis

This study comprises three latent constructs; technostress (Mediator), virtual leadership (Exogenous), and teachers' work wellbeing. All model constructs are second-order constructs. Technostress assessed Learning-teaching process oriented, Profession Oriented, technical issue oriented, Personal oriented, and Social oriented. Virtual leadership measured Traits and skills, ICT in leadership, and Access and support. Teacher wellbeing examined cognitive,

subjective, physical and mental, and social factors. Each item is measured on a scale of 1 (strongly disagree) to 5 (strongly agree) in relation to the provided statement. (Rahlin et al., 2020, 2021, 2022, 2023; Dani et al., 2022; Baharum et al., 2023; Anuar et al., 2023). Before constructing the structural model and conducting Structural Equation Modeling (SEM), it is necessary for the researcher to establish the validity and reliability of all constructs. The evaluation of the construct measurement model will encompass assessments of construct validity, convergent validity, and discriminant validity (Muda et al., 2018, 2020; Awang et al., 2018, 2023; Rahlin et al., 2019a, 2020, 2021, 2022, 2023; Bahkia et al., 2022; Raza & Awang, 2020). This validation procedure is called Confirmatory Factor Analysis (CFA). There are two approaches for doing confirmatory factor analysis, namely the individual CFA method and the pooled CFA method. This study opted to employ the Pooled-CFA approach to perform the Confirmatory Factor Analysis (CFA) procedure for all the constructs. The method is considered to be a more streamlined and effective approach compared to individual methods (Awang et al., 2018). Furthermore, it should be noted that the accuracy of individual confirmatory factor analysis (CFA) is subject to some restrictions (Afthanorhan et al., 2019).

The hypotheses statementof the study is shown in Table 1 and Figure 1.

Table 1
The hyphotesis statement of the study

	Hypothesis Statement	Statistical Analysis
H^1	Technostress mediates the relationship between virtual leadership and work wellbeing among primary school teachers in Sabah	Path Analysis in SEM and bootstrapping

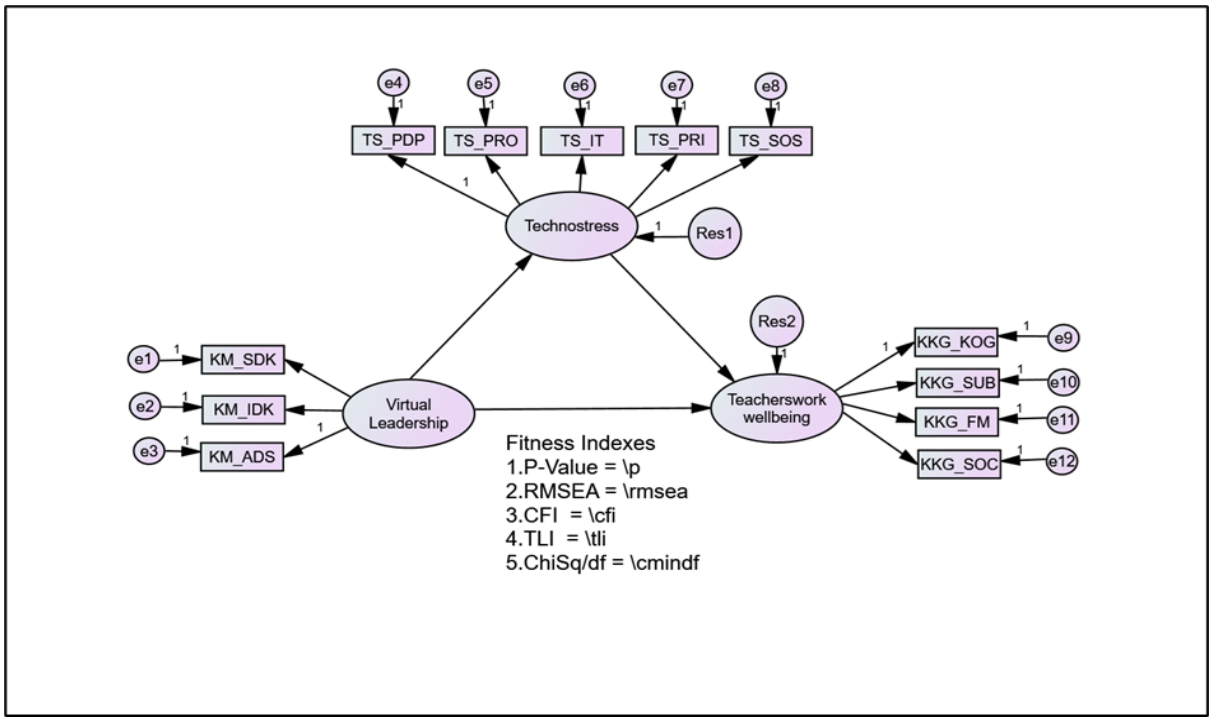

Figure 1: The framework of study

The assessment of the construct measurement model will involve an evaluation of its construct validity, convergent validity, and discriminant validity, as discussed by Awang et al

(2018, 2023). The assessment of construct validity will involve the utilisation of a series of matching indices. Convergent validity will be evaluated by employing the Average Variance Extracted (AVE) measure. Discriminant validity will be evaluated by formulating the Discriminant Validity index (Awang et al., 2018, 2023). To verify that there are no redundant items or highly correlated constructs, discriminant validity as an assessment of multi-collinearity is necessary. If any pair of exogenous constructs is highly correlated (correlation more than 0.85), a major problem known as multi-collinearity exists. (Awang et al., 2018, 2023).

The study will compute Composite Reliability (CR), which is closely similar to Cronbach Alpha in the first-generation analysis approach, for the purpose of reliability assessment. CR is more effective than Cronbach Alpha, which is determined by the measurement score of each item. CR is computed based on the factor loading of each measurement item. In order to achieve Composite Reliability, the CR value should be greater than 0.6 (Awang et al., 2018; Afthanorhan et al., 2019; Mohamad et al.,2018, 2019). Figure 2 depicts the Confirmatory Factor Analysis outputs. The measurement model in Figure 2 demonstrated satisfactory Fitness Indexes (RMSEA = 0.075, CFI = 0.957, ChiSq/df = 2.841), indicating that construct validity was achieved (Raza and Awang, 2020; Mohamad et al., 2018, 2019; Sarwar et al., 2020; Bahkia et al., 2019; Afthanorhan et al., 2020a).

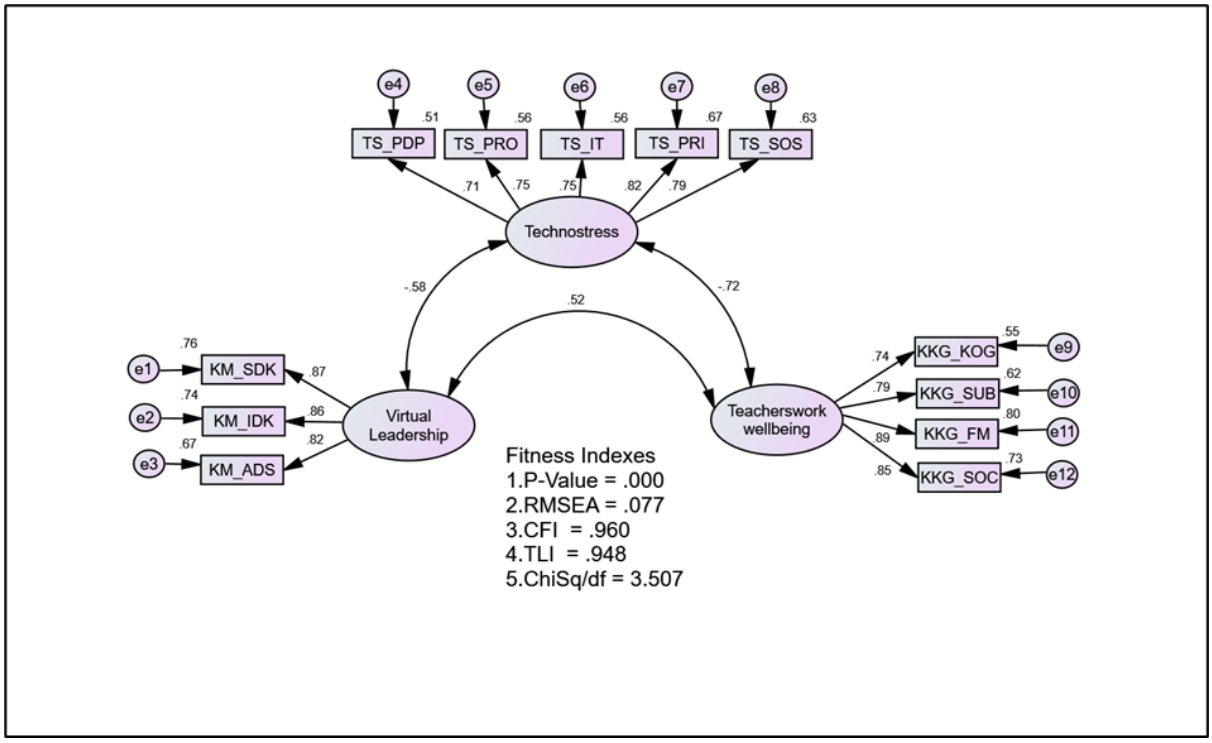

Figure 2: The Pooled-CFA Results

The value of Factor Loading in Figure 2 showed that all items are more than 0.60, indicating that the measures are unidimensional (Asnawi et al., 2019; Majid et al., 2019; Rahlin et al., 2019b). Table 2 shows the AVE and CR values for all constructs, as well as a summary of the discriminant validity index.

Table 2
Average Variance Extracted, Composite Reliability and Discriminant Validity Index Summary

	Average Variance Extracted (AVE)	**Composite Reliability (CR)**	**Virtual Leadership**	**Technostress**	**Teachers work wellbeing**
Virtual leadership	**0.725**	**0.888**	**0.85**		
Technostress	**0.643**	**0.876**	0.58	**0.80**	
Work wellbeing	**0.675**	**0.643**	0.52	0.73	**0.82**

Based on the findings presented in Table 2, the study found that the Average Variance Extracted (AVE) and Composite Reliability (CR) values surpassed the established thresholds of 0.45 and 0.6 respectively (Awang et al., 2018, 2023; Mohamad et al., 2018; Dani et al., 2022; Baharum et al., 2023). Hence, it can be inferred from the study that the model has achieved Convergent Validity and Composite Reliability for all latent constructs. In the model, discriminant validity was established for each construct when the square root of its average variance extracted (AVE) surpassed its correlation value with other constructs (Awang et al., 2018, 2023; Raza & Awang, 2020, 2020a; Baharum et al., 2023). In other words, discriminant validity is achieved if the value in bold (diagonal) is greater than the values in its rows and columns. The study therefore concludes that the constructs has achieved the discriminant validity.

Before modeling the structural model and performing Structural Equation Modelling (SEM), the analysis needs to assess the normality distribution of all items measuring the construct. Since SEM uses a parametric statistical modeling approach, the study needs to assess the normality distribution for all items that measure their respective constructs. According to Awang et al. (2015, 2018), Mohamad et al. (2016, 2017, 2018, 2019), Rahlin et al. (2020, 2020a, 2021, 2022) the study only needs to show that the skewness values for all items do not deviate from normality since the Maximum Likelihood Estimator (MLE) algorithm is robust to skewed data (Muda et al., 2018, 2020; Awang et al., 2018, 2023). Therefore, a skewness value that is in the range between -1.0 to 1.0 is considered a normal distribution if the sample size is less than 200; or between -1.5 to 1.5 can be accepted as a normal distribution if the sample size is greater than 200. The skewness was found to be between -0.017 and 0.414, which does not deviate from the normality distribution. Therefore, it meets the assumption for employing parametric analysis (Hair et al., 2014; Awang et al., 2018; Mohamad et al., 2016, 2017, 2018, 2019; Afthanorhan et al., 2019).

Structural Equation Modelling (SEM)

Once the constructs have met the criteria of unidimensionality, validity, reliability, and normality, the study can proceed to design the structural model and implement the structural equation modelling (SEM) procedures in order to evaluate the hypotheses outlined in this study. Figure 3 displays the outcomes derived from the structural equation modelling (SEM) analysis conducted using IBM-SPSS-AMOS software.

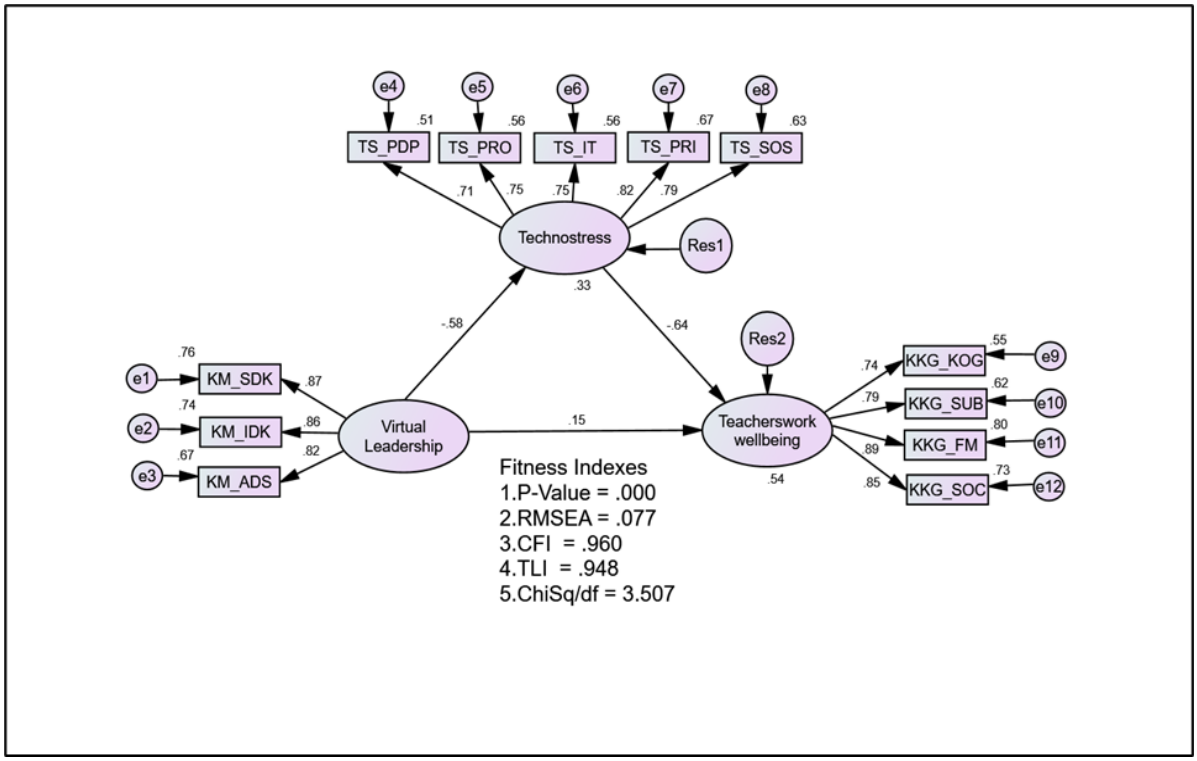

Figure 3: The standardized regression Path Coefficient

The explanation regarding the performance of R^2 (coefficient of multiple determination) of the model (obtained from Figure 3) is explained in Table 3.

Table 3
The R2 and its implication in this study

Endogenous construct	**R^2**	**Conclusion**
Teachers work wellbeing	0.54	Virtual leadership and technostress contribute about 54 percent towards teachers work wellbeing among primary school teachers in Sabah

The regression path coefficient between model constructs is depicted in Figure 4.

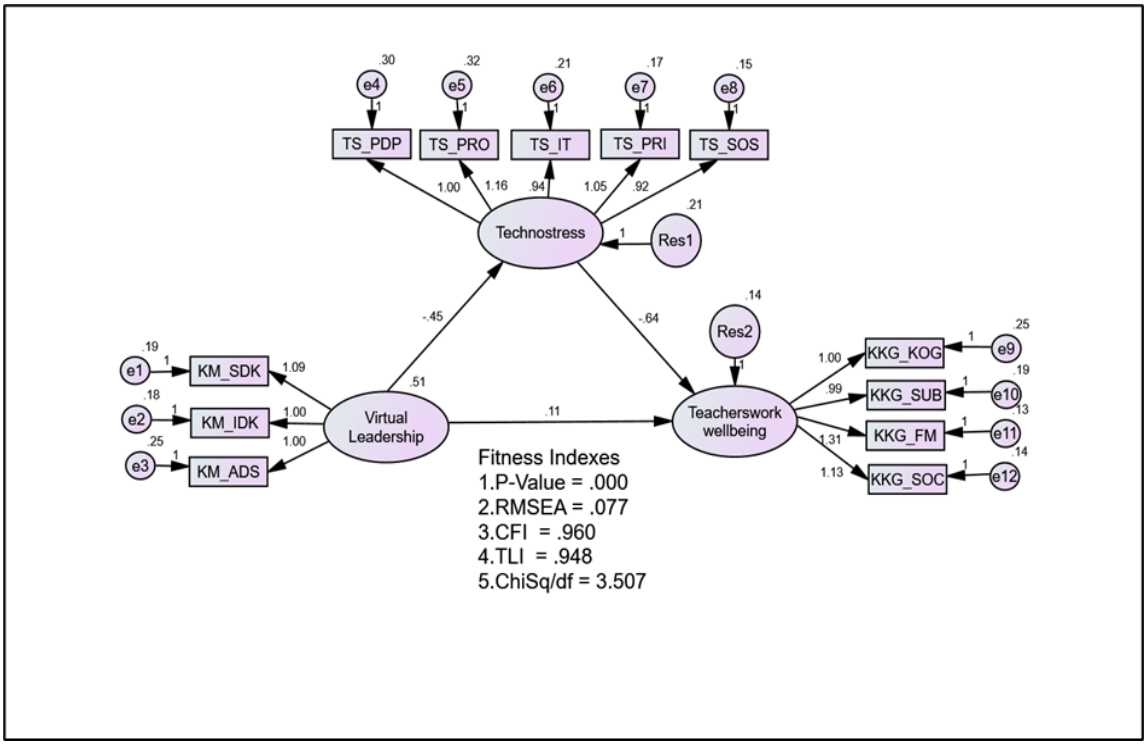

Figure 4: The regression coefficient

Table 4
Summarizes the regression path coefficient between the model's latent constructs and its significance.

			Estimate	S.E.	C.R.	P	Result
Technostress	←	Virtual leadership	-.446	.045	9.961	.001	Significant
Teachers work wellbeing	←	Technostress	-.637	.067	9.490	.001	Significant
Teachers work wellbeing	←	Virtual Leadership	.115	.041	2.788	.005	Significant

The results in the Table 4 are used for testing the mediator effect hypothesis. The hypothesis statement is shown in table 5

Table 5
Testing the mediator Effect Hypothesis

	Hypothesis Statement
H^1	Technostress mediates the relationship between Virtual Leadership and Teachers Work Wellbeing among primary school teachers in Sabah

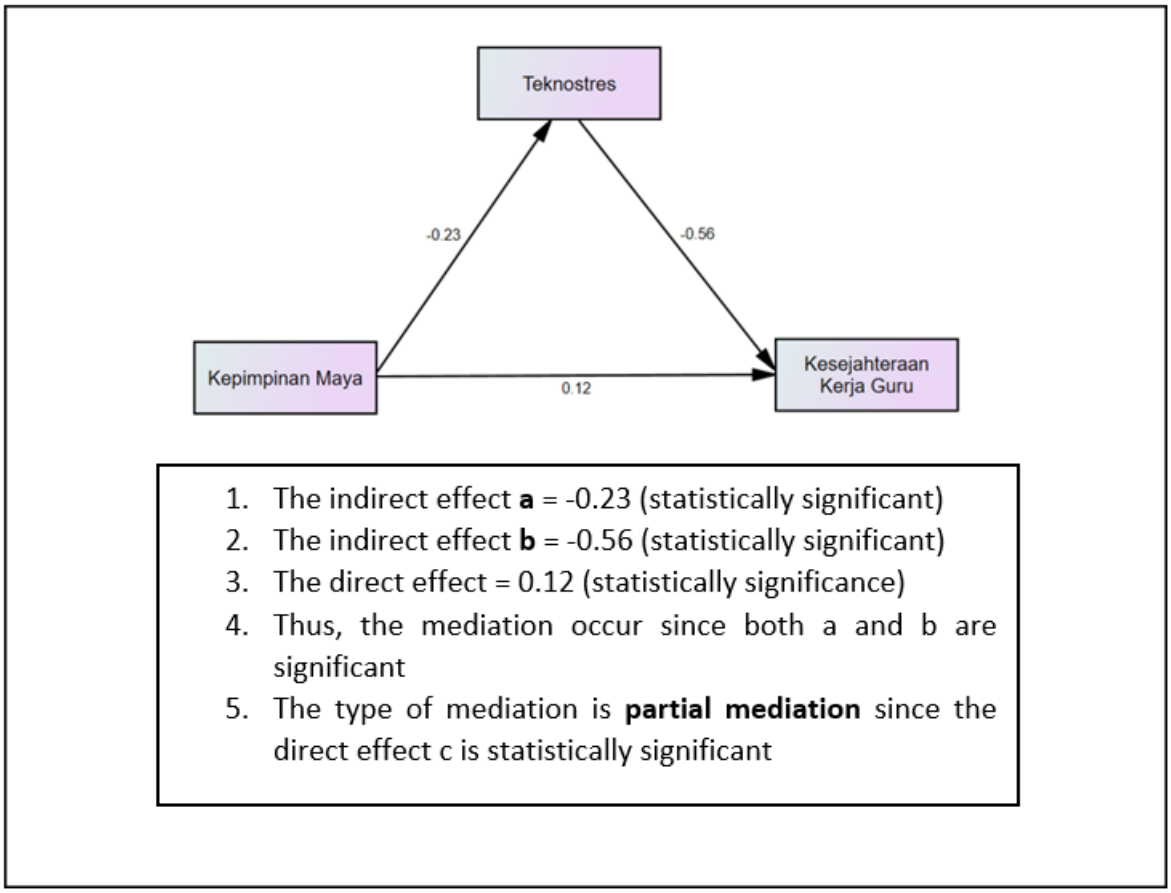

Figure 5: The procedure for testing mediation effect

Confirming the results of mediation test using bootstrapping

It is necessary for the study to validate the findings of standard procedural mediation testing by employing a method called Bootstrapping after conducting the hypothesis test (Awang et al., 2018, 2023; Kashif et al.,2015, 2016; Afthanorhan et al., 2019; Mohamad et al., 2018; Asnawi et al., 2019; Rahlin et al., 2020, 2020a; Bahkia et al., 2019; Mahfouz et al.,2020).

Standardised indirect and direct effects were assessed using Bootstrap. It is recommend 500–1000 bootstrapping samples in this sector (Awang et al., 2018, 2023). The sample mean and standard error will be calculated. Resampling through the algorithm creates a sampling distribution to estimate indirect and direct effects and their probabilities values. (Awang et al., 2018, 2023; Muda et al., 2018, 2020; Bahkia et al., 2019; Mahfouz et al., 2019, 2020; Sarwar et al., 2020). The researcher can evaluate mediation test findings using these values. Researchers can also compare bootstrapping and normal test findings (Awang et al., 2018, 2023; Mahfouz et al., 2019, 2020; Rahlin et al., 2020, 2020a, 2021, 2022; Bahkia et al., 2019; Muda et al., 2018, 2020; Sarwar et al., 2020). This study uses the MLE (Maximum Likelihood Estimator) procedure using 1000 bootstrap samples with 95% percentile confidence intervals and 95% bias-corrected confidence intervals. Table 5 displays the bootstrapping results for testing mediator.

Table 5
The bootstrapping result for testing technostress as mediator

	Indirect effect (ab)	**Direct (c)**
Bootstrapping Value	-0.179	0.127
Probability Value	0.001	0.024
Results on mediation	Significant	Significant
	Mediation exist since indirect effect is significant. Type of mediation is partial mediation since the direct effect is also significant.	

The bootstrapping outcomes for the mediation test, as displayed in Table 5, have validated the findings obtained from the mediation test conducted in Figure 5.

Conclusion

In summary, this research has shown the complex dynamics of virtual leadership and its influence on the work wellbeing of Sabah's primary school teachers. Through a comprehensive analysis of the data, it has been established that technostress plays a pivotal role in mediating the relationship between virtual leadership and teachers' work wellbeing. The existence of partial mediation is supported by the statistical significance of all the paths, indicating that although virtual leadership directly affects work wellbeing, its effects are also influenced and directed by technostress. This finding emphasizes the significance of identifying the technostress elements that may occur in virtual leadership, with important implications for school leaders and educational institutions. Understanding and addressing the issues of technostress in the context of virtual leadership is becoming more important as the educational landscape changes for our teachers' general well-being.

Contribution of The Research

The research conducted in this study regarding the mediating function of technostress in the connection between virtual leadership and the work wellbeing of teachers provides significant contributions to the field of education. This statement emphasises the criticality of proficient virtual leadership in the age of technology, stresses the significance of teachers addressing technostress, and establishes a foundation for approaches to alleviate its consequences. This research not only advances the cause of healthier and more engaged teachers but also enhances the quality of education delivery by improving the wellbeing of teachers at work. The findings of this study can give a clearer direction to policy makers in improving the system and making a positive contribution to the general welfare and efficacy of teachers within the educational system.

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