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Development of Items to Measure Work Stress among Secondary School Teachers in Sarawak: An Exploratory Factor Analysis Procedure

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Abstract

This study aims to develop a valid and reliable survey instrument to measure teacher work stress based on Boyle et al.'s (1995) model using Exploratory Factor Analysis (EFA). The instrument comprises five key components: workload, student misconduct, professional recognition needs, time and resource constraints, and colleague relationship weaknesses. Data were collected from 200 teachers in five secondary schools in Sarawak, analyzed using IBM SPSS 27.0 with Principal Component Analysis (PCA) and Varimax rotation. Out of 35 items, 9 were removed due to low factor loadings, ensuring the remaining 26 met validity and reliability criteria. The findings provide insights into teacher stress factors, supporting the Malaysian Ministry of Education in developing effective interventions. This study contributes a contextually relevant, empirically validated tool for assessing teacher stress, informing policy and practice in Malaysian education.

Keywords: Teacher Work Stress, Exploratory Factor Analysis, Secondary Schools, Sarawak

Perpose of the Study

This study aims to develop a valid and reliable survey instrument to measure the proposed Teacher Work Stress Model by Boyle et al. using the Exploratory Factor Analysis (EFA) approach. The instrument encompasses five key components that reflect significant factors influencing teacher work stress: workload, student misconduct, the need for professional recognition, time and resource constraints, and weaknesses in colleague relationships. Each component is analyzed in-depth to assess the validity and reliability of the instrument in comprehensively measuring teacher work stress dimensions.

Background

Teacher work stress has been gaining increasing global attention and is recognized as a major challenge in the education sector, including in Malaysia. Teachers play a crucial role in shaping quality human capital; however, rising workloads and high job demands often result in

significant work stress. According to a UNESCO report (2024), more than 50% of teachers worldwide experience high levels of work stress, directly impacting their well-being and teaching quality. Unmanaged work stress not only affects teachers' physical and mental health but also compromises classroom effectiveness, leading to declining student performance and increased teacher attrition (Choi et al., 2023). Furthermore, prolonged exposure to high work stress can lead to burnout, emotional exhaustion, and strained professional relationships, creating a less supportive work environment (Shamsuddin & Abdullah, 2022). Despite its critical impact, there is limited empirical research on teacher work stress within the context of secondary schools in Sarawak, particularly regarding its contributing factors and reliable measurement. Current interventions often lack a data-driven approach, making it difficult for school administrators to implement targeted stress management strategies (Rahman et al., 2022). Addressing this gap, this study aims to provide empirical validation of the five key dimensions of teacher work stress—workload, student misconduct, the need for professional recognition, time and resource constraints, and weak colleague relationships. Furthermore, this research will develop and evaluate a validated teacher work stress instrument using Exploratory Factor Analysis (EFA), ensuring a reliable measurement framework. The findings from this study are expected to offer valuable insights for educational policymakers, school leaders, and mental health professionals to design more effective stress management programs, ultimately fostering a healthier and more productive teaching environment.

Methodology

The methodology used in a study plays a crucial role in achieving research objectives. This study employs a cross-sectional research design, as it allows for the measurement of teacher work stress factors within a specific time frame, providing a clear overview of the stress levels experienced by teachers. A quantitative approach was adopted, with data collected through a self-administered questionnaire. Prior to developing the instrument, a comprehensive literature review was conducted to identify relevant items for measuring the construct of teacher work stress. These items were then adapted and modified to align with the Malaysian education context, particularly in Sarawak. The study sample consists of 200 secondary school teachers selected randomly from five daily secondary schools. A stratified random sampling technique was employed to ensure representation across various backgrounds, such as years of teaching experience and subject specialization. For data analysis, Exploratory Factor Analysis (EFA) was conducted using IBM-SPSS version 27.0. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's Test of Sphericity were used to assess data suitability for factor analysis. Principal Component Analysis (PCA) and Varimax rotation were applied to identify the key dimensions of the teacher work stress construct.

Instrument

In this study, teacher work stress is measured based on five key dimensions: workload, student misbehavior, need for professional recognition, time/resource constraints, and weak collegial relationships. These dimensions are derived from the Teacher Stress Model introduced by Boyle et al. (1995), which outlines the primary factors contributing to teacher stress levels. To ensure a comprehensive and accurate measurement of teacher work stress, this study adopts questionnaire items adapted from several validated instruments used in previous research, including the Teacher Stress Inventory (Boyle et al., 1995), Self-Report Teacher Stress (Kyriacou & Sutcliffe, 1978), and Dimensions of Occupational Stress (Payne &

Furnham, 1987). The selection of these instruments is based on strong justifications, particularly their ability to measure teacher work stress holistically and their suitability in the educational context of Sarawak.

First, integrating items from different instruments enables a more comprehensive assessment of teacher work stress, aligning with the Teacher Stress Model (Boyle et al., 1995). This model emphasizes that teacher stress is influenced by multiple factors, including excessive workload, role conflict, and organizational support. By incorporating items from these three instruments, each dimension of teacher stress is measured with greater depth and relevance to the local educational setting (Boyle et al., 1995). Second, utilizing multiple instruments allows for contextual adaptation of teacher stress measurement in Sarawak. The original instruments were developed in Western educational settings, which may not fully capture the realities of teaching in Malaysia. Therefore, selecting and adapting items from various instruments ensure that the questionnaire reflects the actual experiences of teachers in Sarawak, thereby enhancing the ecological validity of this study (Ng et al., 2022). Third, this approach aligns with international research practices on teacher stress, where researchers frequently combine items from previously validated instruments to ensure broader and more comprehensive conceptual coverage. The use of items from the Teacher Stress Inventory, Self-Report Teacher Stress, and Dimensions of Occupational Stress in this study not only enhances measurement accuracy but also ensures alignment with established empirical approaches in existing literature (Khalid et al., 2021). Overall, the selection of instruments in this study has been carefully undertaken to ensure that the measurement of teacher work stress is comprehensive, valid, and appropriate for the research context. The integration of empirically tested items and the implementation of factor analysis ensure that the instrument maintains high psychometric accuracy in assessing teacher work stress.

Exploratory Factor Analysis (EFA) Procedure

Exploratory Factor Analysis (EFA) is used to explore and assess the relationships between questionnaire items and identify the underlying factor structure of the studied constructs (Al-Edenat, 2018; Wesam Ali, 2018). EFA aims to determine whether the items in the questionnaire form valid and reliable constructs. This technique also helps identify the best elements for each factor and eliminates items that are unsuitable for measuring the studied construct (Uma Sekaran, 2009). In this study, EFA is conducted using several key procedures to ensure construct validity and reliability.

The first step in EFA is to conduct Bartlett's Test of Sphericity to assess whether the correlation matrix in the data is suitable for factor analysis. A significant p-value ($p < 0.05$) indicates that the relationships between items are strong enough to proceed with factor analysis. Additionally, the Kaiser-Meyer-Olkin (KMO) measure is used to determine the adequacy of the sample size for factor analysis. A KMO value above 0.60 is considered adequate, while a value above 0.80 indicates very good adequacy (Hair Jr et al., 2015). The factor extraction method using Principal Component Analysis (PCA) is employed to identify the appropriate number of factors. The selection criteria for factors are determined based on an eigenvalue greater than 1, indicating that the factor contributes significantly to data variance.

To enhance the clarity of relationships between factors and maximize data interpretation, the Varimax rotation technique is used. This method helps identify items with high correlations with specific factors while minimizing cross-loadings between factors. The selection of items in the questionnaire is based on a factor loading value exceeding 0.50, as items with lower loading values may not contribute strongly to the measured construct. Items that exhibit low loading or high cross-loadings between factors will be considered for removal from the questionnaire. Once the analysis is completed, the derived constructs are tested for validity and reliability to ensure their suitability for use in national secondary schools (SMK Harian) in Sarawak.

Results

The measurement approach in this study utilizes an interval scale ranging from 1 (strongly disagree) to 10 (strongly agree) for each item provided to measure the construct of Teacher Work Stress. This scale was chosen to offer greater variation in participant responses, thereby enhancing the instrument's ability to capture the level of work stress experienced by teachers more accurately (Majid et al., 2019; Zainudin, 2015; Awang & Baharu, 2018).

The collected data were analyzed using descriptive statistics to determine the distribution of teachers' responses to each item. The results of the descriptive analysis for measuring teacher work stress are presented in Table 1, which displays the mean scores and standard deviations for each item in the instrument.

Table 1
The Descriptive Statistics for items measuring Teacher Work Stress Construct

Item	Statement	Mean	Std. Deviation
	Workload		
W1	Being held accountable for students' failure in exams.	6.81	2.305
W2	Too much work to do (e.g., preparing/grading exam papers, daily lesson planning).	7.32	2.011
W3	Performing administrative/clerical tasks that are not part of teaching duties.	7.38	1.943
W4	Acting as a substitute teacher due to the absence of other teachers.	6.65	2.365
W5	Having a high number of actual teaching hours.	6.10	2.640
W6	Teaching subjects that are not within my specialization.	4.58	3.061
W7	Work demands after school hours (e.g., co-curricular activities, meetings).	6.45	2.370
	Student Misconduct		
SM1	Teaching a class with disciplinary problems.	6.57	2.509
SM2	Students making noise while the teacher is teaching.	6.45	2.548
SM3	Managing a class with a large number of students.	6.79	2.518
SM4	Controlling students' discipline in class.	6.87	2.376
SM5	Students behaving rudely or disrespectfully.	6.71	2.434
SM6	Students lacking motivation to learn.	7.13	2.052
SM7	Students being lazy to bring necessary materials for learning.	6.92	2.224
	Need for Professional Recognition		
NPR1	Unattractive career progression structure for teachers (limited promotion opportunities in the teaching profession).	5.44	2.322

NPR2	Lack of recognition/appreciation for teaching excellence in the subjects taught.	5.81	2.365
NPR3	Salary not commensurate with workload.	5.42	2.678
NPR4	Lack of recognition/appreciation from administrators for extra work beyond school hours.	5.63	2.440
NPR5	Limited opportunities to express opinions in decision-making.	4.99	2.356
NPR6	Not receiving recognition/appreciation for special efforts made for the school.	5.11	2.419
	Time/Resource Constraints		
TRC1	Short break times.	5.90	2.500
TRC2	Unclear syllabus.	4.46	2.595
TRC3	Lack of time to focus on individual students.	6.60	2.264
TRC4	Insufficient teaching aids (e.g., LCD, projector, computer, internet, sports facilities).	6.63	2.515
TRC5	Difficulty in completing the syllabus within the available time.	6.52	2.514
TRC6	Lack of free time for personal activities with family.	6.26	2.460
TRC7	Limited time to prepare daily lesson plans.	5.85	2.488
TRC8	Limited time to mark students' exam papers.	6.19	2.601
TRC9	Teaching students with diverse intelligence levels.	6.56	2.299
	Poor Colleague Relationships		
PCR1	Pressure from parents who overly emphasize students' academic excellence.	5.38	2.278
PCR2	Colleagues who are irresponsible/passive.	5.63	2.617
PCR3	Pressure from school administrators/education officers to improve students' academic performance.	6.51	2.301
PCR4	Lack of support from fellow teachers in handling activities.	5.28	2.446
PCR5	Principal being unfair/showing favoritism.	4.22	2.507
PCR6	Principal refusing to investigate serious misconduct cases reported.	4.13	2.628

Bartlett's Test and KMO Value

The analysis results presented in Table 2 indicate that Bartlett's Test of Sphericity is highly significant (sig. = 0.000), demonstrating that the data exhibit sufficient correlations for factor analysis to be conducted. Additionally, the Kaiser-Meyer-Olkin (KMO) sampling adequacy test recorded a value of 0.916, which is categorized as excellent, as it exceeds the minimum recommended threshold of 0.6 in the literature (Mahadzirah et al., 2019; Bahkia, Awang, Afthanorhan, Ghazali, & Foziah, 2019; Hoque et al., 2018). These two key findings indicate that the collected data are adequate for proceeding with the EFA procedure, thereby allowing for a more systematic and effective data reduction process. Consequently, each factor identified through EFA can more accurately represent the dimensions of teacher work stress within the context of this study (A. Hoque et al., 2017; Hoque et al., 2018; Noor, Aziz, Mostapa, & Awang, 2015; Yahaya, Idris, Suandi, & Ismail, 2018).

Table 2
Bartlett's Test and KMO Value

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.916
Bartlett's Test of Sphericity	Approx. Chi-Square	4437.794
	df	351
	Sig.	.000

The Components and Total Variance Explained

Table 3 presents the five components obtained based on the computed eigenvalues. The eigenvalues for these components range from 1.115 to 12.228. Specifically, the total variance explained by each component is as follows: the first component accounts for 45.291%, followed by the second component (10.915%), the third component (6.535%), the fourth component (5.955%), and the fifth component (4.130%). Overall, the total variance explained for this construct is 72.826%, which exceeds the minimum threshold of 60% recommended in previous studies (Bahkia et al., 2019; A. Hoque et al., 2017; Yahaya et al., 2018). Therefore, these findings indicate that the analyzed construct demonstrates sufficient stability and validity.

Table 3
The Total Variance Explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.228	45.291	45.291	12.228	45.291	45.291
2	2.947	10.915	56.206	2.947	10.915	56.206
3	1.764	6.535	62.741	1.764	6.535	62.741
4	1.608	5.955	68.696	1.608	5.955	68.696
5	1.115	4.130	72.826	1.115	4.130	72.826

Table 4 presents the five components along with their corresponding items based on the results of factor analysis. To ensure the validity and effectiveness of each item within the construct, the factor loading for each element must reach or exceed the threshold value of 0.50. Items with factor loadings below this threshold are generally recommended for removal to maintain the clarity of the factor structure and enhance the reliability of the studied construct (Hair et al., 2022; Tabachnick & Fidell, 2019; Zainudin, 2021).

Table 4
The Number of Components

Rotated Component Matrix[a]					
	Component				
	1	2	3	4	5
W1					.732
W2					.778
W3					.728
SM1	.783				
SM2	.792				
SM3	.704				
SM4	.736				
SM5	.829				
SM6	.835				
SM7	.824				
NPR1			.603		
NPR2			.859		
NPR3			.677		
NPR4			.868		
NPR5			.663		
NPR6			.824		

TRC3	.723	
TRC4	.679	
TRC5	.681	
TRC6	.677	
TRC7	.744	
TRC8	.757	
TRC9	.567	
PCR4		.739
PCR5		.843
PCR6		.854

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 6 iterations.

Figure 1 illustrates the scree plot for the Principal Component Analysis (PCA), depicting the eigenvalues for each component. The analysis results indicate that the first component has an eigenvalue exceeding 12, followed by a sharp decline in the second and third components. According to Kaiser's criterion (Kaiser, 1960), components with eigenvalues greater than 1 are considered significant in explaining the data structure. In this scree plot, the first five components maintain eigenvalues above the threshold of 1, while the remaining components show progressively smaller eigenvalues, eventually leveling off. This phenomenon aligns with the elbow method, where a distinct bend at the fifth component marks the optimal point for factor selection. Therefore, these five main components are deemed sufficient to explain most of the information in the data and can be used for further analysis.

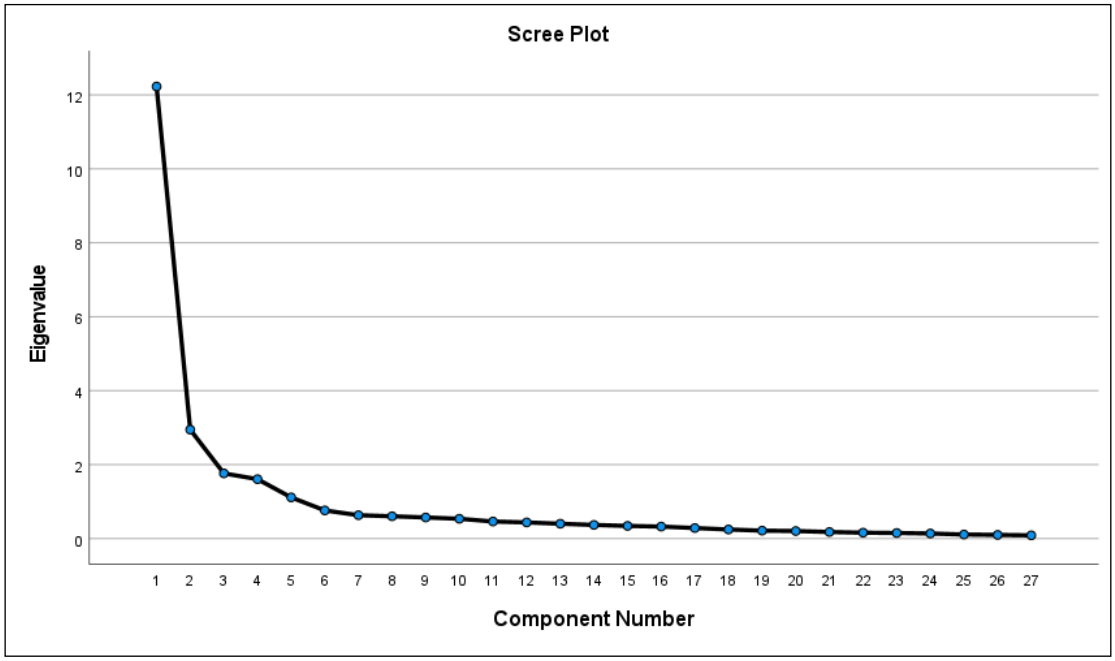

Figure 1: Five Components Extraction

Internal Reliability

To ensure the reliability of the instrument in measuring the construct of Teacher Work Stress, this study calculated the Cronbach's Alpha values for each extracted component. Internal reliability is a crucial aspect in assessing the consistency of items within a construct, where a Cronbach's Alpha value exceeding 0.7 indicates a good level of reliability (Rahlin et al., 2019).

Table 5 presents the Cronbach's Alpha values for the five main components measuring Teacher Work Stress. All components recorded Cronbach's Alpha values above 0.7, with the highest value observed for the Student Misconduct component (0.934) and the lowest for the Workload component (0.822). Additionally, the overall Cronbach's Alpha value for all 26 items was 0.951, indicating a very high level of internal reliability.

Table 5
The Cronbach' Alpha for Internal Reliability

Reliability Statistics			
Component	Name	Number of Items	Cronbach's Alpha
1	Student Misconduct	7	0.934
2	Time/Resource Constraints	7	0.913
3	Need for Professional Recognition	6	0.917
4	Poor Colleague Relationships	3	0.883
5	Workload	3	0.822
	Total	26	0.951

These findings are consistent with previous studies, which indicate that instruments with a Cronbach's Alpha value exceeding 0.9 are considered to have excellent reliability in psychometric research (Bahkia et al., 2019; A. Hoque et al., 2017; Yahaya et al., 2018). Therefore, the instrument used in this study is reliable and appropriate for measuring teacher work stress. Consequently, this study suggests that the Teacher Work Stress construct can be utilized in future research to further explore the factors influencing teacher well-being in schools.

Conclusion

This study makes a significant contribution to the measurement of the Teacher Work Stress construct, particularly in the context of daily secondary schools in Sarawak. The results of the Exploratory Factor Analysis (EFA) identified five key components that can be measured using 26 designated items. The instrument demonstrated high reliability and validity, as evidenced by a Cronbach's Alpha value exceeding 0.7 (Rahlin et al., 2019), a significant Bartlett's test result, a Kaiser-Meyer-Olkin (KMO) value above 0.6 (Bahkia et al., 2019), and factor loadings meeting the minimum threshold of 0.5 (Hoque et al., 2017). These findings confirm that the items used in this study are valid and reliable for measuring Teacher Work Stress (Yahaya et al., 2018). The rigorous scale development and validation procedures employed ensure that this instrument remains stable and consistent across study samples. Therefore, this study suggests that the validated instrument can be applied in future research to gain deeper insights into teacher work stress and contribute to efforts aimed at enhancing teacher well-being in schools.

Limitations and Future Studies

This study has several limitations that should be considered to strengthen future research. First, respondent bias is an uncontrollable issue during the data collection process. The reluctance of participants to complete the questionnaire or their demanding work schedules may affect the accuracy of the findings. Second, the scope of this study is limited to five daily secondary schools in Sarawak, with a sample of only 200 teachers selected randomly. This relatively small sample size may not fully represent the entire population of daily secondary school teachers in Malaysia. Therefore, future studies are encouraged to expand the scope

by involving more schools and a larger sample size to ensure the reliability and validity of the Teacher Work Stress measurement in a broader context. Third, this study employs a cross-sectional research design, where data is collected at a single point in time. This approach does not allow for the tracking of changes or the development of Teacher Work Stress over time. Hence, future research is recommended to adopt a longitudinal design to understand how teacher work stress evolves over time and identify factors influencing these changes. By addressing these limitations, future studies can provide a deeper understanding of teacher work stress and develop more effective strategies for managing this issue in educational settings.

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Authors' Contribution
1. Mohd Rosdan Mohamed: Investigation, Data Collection, Data management, Conceptualization, Methodology, Formal Analysis, Writing - Original Draft, Project Administration.
2. Marinah Awang: Supervision, Project Administration, Writing - Review & Editing.
3. Dayang Rafidah Syariff M. Fuad: Statistical Analysis, Validation, Resources, Writing - Review & Editing.

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