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Capturing School Context Characteristics Using the Job Demands-Resources Model: Adaptation and Validation

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Abstract: Work environments are pivotal to teachers' professional development. However, effective instruments assessing teachers' perceived work context are still lacking. The principal aim of the present study was to validate a Work Environments Inventory for Teachers (WEIT) constructed using the Job Demands-Resources (JD-R) model. Two studies were implemented on two independent samples totaling 696 (232 for Study 1 and 464 for Study 2) schoolteachers in Mainland China. Both exploratory and confirmatory factor analyses were employed to cross-validate the WEIT. The external construct validity of the WEIT was estimated through investigating its connection with the Thinking Styles in Teaching Inventory. Findings indicated that the WEIT is an adequate measure to map the characteristics of work environments for schoolteachers. Limitations are discussed and implications for future studies are suggested.

Keywords: *Cross-validation, job demands-resources, thinking styles in teaching, work environments.*

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Introduction

After entering the teaching profession, most teachers will spend, on average, twenty-five to thirty years in schools (B. Li & Z. Li, 2021; Meirink et al., 2020). During these years, work environments are a witness of and important part in teachers' professional development. Prior research has repeatedly indicated that teachers in supportive and conductive work environments show stronger teacher identity as represented by higher self-efficacy in teaching or enhanced motivation to teach, in comparison with those in schools that lack such resources and opportunities (Björk et al., 2019). As pointed out by Schleicher (2011), "the quality of teaching and teacher cannot exceed the quality of the work organization in which teachers find themselves" (p.10).

Notwithstanding the importance of work environments attached to teachers' professional growth, there still lacks a universally accepted measure. Moreover, most of the existing measures for work environments are specific to corporate settings other than the teaching profession. The present research aimed to construct and validate an instrument of work environments for teachers, namely, Work Environments Inventory for Teachers (WEIT) grounded in the Job Demands-Resources (JD-R) model (Bakker et al., 2003). To this end, two studies were conducted with two independent samples in Mainland China using multiple methods of validations. To check its external construct validity, the association between work environments for teachers and teaching styles were explored using the Thinking Styles in Teaching Inventory (TSTI) in the second study.

Literature Review

Work Environments and the Job Demands-Resources Model

For schoolteachers, work environments generally refer to the school context that incorporates "attitudes and mores, both tangible and ineffable, that pervade the classroom and the school as a whole, [which] are critical factors influencing teacher morale, longevity, and commitment" (Cohen et al., 2003, p. 37). However, in terms of teachers' professional development, work environments can be either demanding and restrictive or resourceful and conducive (Huang et al., 2020).

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Research on teachers' work environments has mainly drawn on theoretical frameworks established for corporate settings, resulting in several models like the Demand-Control model and the job characteristics model (Doménech-Betoret et al., 2015). However, as Bakker et al. (2003) pointed out, these frameworks are with drawbacks in terms of their *one-sidedness* (i.e., attending to either job stress or work motivation), *simplicity* (i.e., exclusive of the strengths of one another), and *ignorance of the changing nature of jobs* (i.e., incapable of capturing the complexity of contemporary jobs).

Demerouti et al. (2001) have provided the by far most widely accepted theory, the Job Demands-Resources (JD-R) model, for assessing employees' work environments. The JD-R model suggests that no matter how the nature of jobs varies, work environments are composed of two essential categories. One is job demands that manifest the stress strand; the other, job resources, denoting the motivation strand. Over nearly two decades, the JD-R model has been extensively researched in diverse corporate settings (e.g., federal government, economic sectors, banking, manufacturing, and mining industries) (Bakker et al., 2003; Demerouti et al., 2001). In educational settings, an equally impressive body of studies have been conducted using the JD-R model in association with varying constructs such as mental health, well-being, need satisfaction, self-efficacy, organizational commitment, and work engagement (Alarcon, 2011; de Beer et al., 2012).

Job demands refer to physical-social parts of the job that demand emotional or physical input (Hargreaves, 2000). There are basically two job demands: quantitative demands and emotional demands. Examples of quantitative demands, in educational settings, include work overload, high time pressure, irregular working hours, and unfavorable work conditions (e.g., cramped office, ill-quipped classrooms, noise, and threats to health). Emotional demands in the teaching context may take on such forms as dealing with difficult situations or people (e.g., disruptive students, bad-tempered parents, and disagreeable colleagues), investment of sympathy, and efforts in regulating emotions (e.g., controlling temper and psyching oneself up). Many researchers (Näring et al., 2012; Richter & Hacker, 1998; Tuxford & Bradley, 2015) have noted that in some specific occupations such as nursing, healthcare, and teaching, the influence of emotional demands is prevalent. For example, in Tuxford and Bradley's (2015) study of 556 primary school teachers, results demonstrated that emotional demands, compared with non-emotional demands, exerted a more profound impact on psychological well-being. In the present study, special attention was attached to the part of emotional demands in the first-year teachers' teacher identity.

In the JD-R model, job resources subsume only external resources that refer to physical-social aspects of the job that are helpful for growth achievement and personal development (Richter & Hacker, 1998). Demerouti et al. (2001) proposed five major job resources including, for example, superior support and workmate support. Contrary to job demands, job resources are found to predict positive attitudes and outcomes such as strengthened work engagement, higher levels of job satisfaction, increment in work motivation, work enjoyment, lowered turnover intentions, and occupational well-being (Trépanier et al., 2014; Westman et al., 2011).

Job Demands-Resources and Intellectual Styles

Intellectual styles of teachers are their individualized ways of dealing with problems (Zhang, 2017). Intellectual styles serve as an encompassing term consisting of teaching styles, thinking styles, personality type, field in/dependence, etc. According to the threefold model, extant intellectual styles fall into three types: Type I, Type II, and Type III. Type I styles associate with higher-order thinking, Type II styles are bound with norms and conventions, while Type III styles partially demonstrate features of both Type I and Type II styles (Z. Li & B. Li, 2021).

There is empirical support for the argument for an environment-style congruence (Zhang, 2013). One earliest study was conducted by Sternberg and Grigorenko (1995) among 85 teachers from four schools. Significant differences were identified across schools in six of the seven teaching styles measured. For example, the teachers from a private school (rated to show a legislative school style) scored the highest on the Type I legislative teaching style, whereas a Catholic school and is participating teachers both scored the highest on the Type II executive teaching style.

Later, Zhang and collaborators (Zhang & Higgins, 2008; Zhang & Sternberg, 2002) conducted a series of studies relating thinking styles or teaching styles to constructs in work environments. Zhang and Sternberg's (2002) study found four significant and positive relationships between teaching styles and work environments. Two of these relationships, for example, were: (1) perceived job autonomy in choosing teaching contents with the Type I legislative teaching style; and (2) perceived growth opportunities, as represented by positive expectations for a salary increase, with the Type II executive and the conservative teaching styles. Inconsistent findings were also reported in Zhang and Higgins' study (2008). The research participants were 107 managerial personnel. This time, high levels of perceived job autonomy predicted not only high levels of two Type I styles, but also that of the Type III oligarchic style.

Methodology

Research Design

The present research falls into two consecutive studies (Study 1 and Study 2) with an interval of one year. Among two independent samples, the WEIT was constructed and cross-validated to (1) to tap the work environment for teachers through two major components: job demands and job resources, (2) to demonstrate reliable internal consistency, and (3) to exhibit high external construct validity by exploring the relationship between work environments and teaching styles.

With the empirical evidence from prior research, it could be specifically hypothesized that job demands would be positively associated with Type II teaching styles featuring conformity and teacher-centeredness. By contrast, job resources (e.g., growth opportunities) would be positively associated with Type I teaching styles featuring nonconformity and autonomy.

Participants

Study 1 was carried out in 2020, participants were 232 (28 males, 12.1%; 204 females, 87.9%) first-year schoolteachers (23.68 ± 1.32 years), who were graduated from a teacher training university. Among them, 132 were senior-high-school teachers, 75 were junior-high-school teachers, and 25 were teaching in elementary schools. One primary reason for the gender imbalance is that this sample was drawn from a cohort of English as Foreign Language (EFL) teachers, a population conventionally dominated by females (B. Li & Z. Li, 2021).

One year after Study 1, Study 2 was conducted with 464 (122 males, 26.3%; 342 females, 73.7%) participants, aged 23.99 ± .98. Among them, 297 were teaching in senior high schools, 144 were teaching in junior high schools, and 23 were elementary school teachers. The gender imbalance of sampling occurred again due to the same reason as discussed earlier.

Instruments

In previous studies, the JD-R varied in dimensions and the number of items, depending on interested research questions. For simplicity, the WEIT in the present research took a seven-dimension version of the JD-R, with each dimension measured by four items. These seven dimensions are: quantitative demands, emotional demands, workmate support, performance feedback, superior support, workmate support, growth opportunities performance feedback, and job autonomy. Specifically, the three dimensions of and superior support, emotional demands, and quantitative demands were drawn from the JD-RI utilized in Westman et al.'s (2011) study, while the other four were from the JD-RI in Rothmann and Jordaan's study (2006). The participants respond to these statements on a seven-point Likert scale, where "1" denoted "completely disagree" and "7" represented "completely agree". The WEIT underwent translation and back translation. Moreover, a panel (one professor in psychology, two PhD candidates in psychology, and five in-service schoolteachers) was invited to check item relevance and clarity, to guarantee the content validity of all the inventories utilized. Details of the WEIT are presented in Table 1.

Table 1. Distribution of Items in the Finalized WEIT

Dimension	Item
Quantitative demands	I often have too much work.
	I often work with tight schedule.
	My work requires hard work.
	My work demands of extra effort.
Emotional demands	My work sometimes puts me in emotionally charged situations.
	My work is emotionally demanding.
	My work puts me in emotionally frustrating situations.
	In my work, I have to deal with difficult people.
Superior support	I can turn to my supervisor when facing difficulties in my work.
	I can count on my supervisor for trouble shooting.
	In my work, I can feel appreciated by my supervisor.
	My nearest superior is always willing to listen to my problems at work.
Workmate support	I can have a chat with colleagues during working hours.
	I can have enough opportunities to work with colleagues during working hours.
	I can talk with my colleagues when encountering difficulties in my work.
	If necessary, I can turn to my colleagues for advice.
Performance feedback	My direct supervisor informs me about how he evaluates my work.
	I know what my supervisor expects of me in my work.
	I know how my direct supervisor assesses my performance.
	I receive sufficient feedback on the outcomes of my work.

Table 1. Continued

Dimension	Item
Job autonomy	My work allows me to think and act independently.
	I can plan my own work activities.
	I am allowed freedom to carry out my work activities.
	I can decide on my own work progress.
Growth opportunities	My work allows me opportunities for career growth.
	My work helps to develop my skills and capacities.
	My work allows varieties.
	My work empowers me to believe that I can achieve something.

The slightly revised WEIT was employed in Study 2. As mentioned above, a dual-loaded item (i.e., Item 20) was reworded to avoid possible ambiguity. The Thinking Styles in Teaching Inventory (TSTI; Grigorenko & Sternberg, 1995) served the need to assess teaching styles in the present research. Four (the legislative, liberal, executive, and conservative) styles were measured with a total of 28 items.

Data analysis

In Study 1, with SPSS 23.0, a process involving a series of statistical techniques was performed. As a point of departure, outliers were eliminated through data screening, while missing values of items were replaced by series means. To estimate psychometrics of all the inventories utilized in the present research, estimates of internal consistency, exploratory factor analysis (EFA).

Likewise, in Study 2, data were screened concerning data accuracy, missing data, outliers, univariate normality, and multicollinearity. Both EFA and confirmatory factor analysis (CFA) were conducted using SPSS 23.0 and AMOS 23.0. Regarding internal construct reliability, the composite reliability (CR) rather than Cronbach's coefficient alpha was calculated (Peterson & Kim, 2013). CR conventionally represents comparatively true reliability which might be otherwise underestimated by Cronbach's α (Cronbach, 2004). The cut-off score of CR is usually .70. With respect to validity, as highly recommended by Van Prooijen and Van Der Kloot (2001), an EFA was performed for each inventory to yield a factor model, which was tested by a CFA in the same dataset.

Results

In Study 1, the factor structure of the WEIT was explored by an EFA using both the Maximum Likelihood with direct oblimin rotation and the PCA with varimax rotation. Because varied numbers of factors have been reported in previous studies (Creswell & Clark, 2011; Mokhtar et al., 2021), the criteria for factor extraction were eigenvalues larger than 1.0, with .40 being the cutoff score to suppress items. Seven factors were extracted from both the ML and the PCA, accounting for 56.18% and 66.29% of the variance in work environments, respectively. Focusing upon the results from the PCA, it was found that all the items loaded on their theoretically expected factors. There was only one cross-loaded item (Item 20 with loadings of .43 on the scale for superior support and .65 on that for performance feedback). In addition, extraction communalities of all the items were in the range of .44-.87, which was better than acceptable. These results suggested that the WEIT could be used in Study 2 without major revision. However, wording modification was needed for the cross-loaded item. Factor loadings of the WEIT can be seen in Table 2. Alpha coefficients of the seven factors were in the range of .72 (growth opportunities) to .88 (job autonomy). These reliabilities were comparable to what were reported in existing studies.

Table 2. Factor Loadings for EFA in Study 1

Dimension	Item	Component						
		1	2	3	4	5	6	7
Job autonomy	22	.900						
	23	.829						
	21	.812						
	24	.745						
Workmate support	15		.836					
	14		.827					
	13		.784					
	16		.675					
Superior support	12			.851				
	9			.847				
	11			.781				
	10			.434				

Table 2. Continued

Dimension	Item	Component						
		1	2	3	4	5	6	7
Performance feedback	18				.851			
	17				.753			
	19				.725			
	20			.427	.654			
Emotional demands	6					.871		
	7					.846		
	8					.739		
	5					.404		
Quantitative demands	1						.758	
	3						.723	
	2						.706	
	4						.668	
Growth opportunities	27							.749
	28							.680
	26							.648
	25							.640

In Study 2, the seven-factor structure was perfectly replicated in the EFA, each subsuming four expected items. This factor structure explained 58.59% of the variance in work environments, dropping negligibly from the portion (66.29%) reported in the pilot study. Initial results from the CFA were: x^2(329, N=464) =6.99, p<.001, GFI=.86, RMSEA=.06, CFI=.90, and NFI=.85. Modifications were made by adding covariance to error terms of three item pairs (i.e., Items 3, 5; Items 15, 16; Items 17, 18). In so doing, the x^2 values were reduced appreciably (e.g., by 38.35 when covariance of Items 3 and 5 was added). Better fit indices were obtained from the re-specified model: x^2(326, N=464)=4.85, p<.001, GFI=.88, RMSEA=.06, CFI=.92, and NFI=.87. The CFI was taken to be more reliable than the NFI here because the former is argued to be more reliable when conflicting values of the two emerge(Cronbach, 2004). Additionally, the seemingly unsatisfactory GFI (.88) might be chiefly due to the large ratio of degrees of freedom (326) to the sample size (464). Based on the finalized model above, the values of CR were estimated. Sound construct reliability of the WEIT was evidenced by the results: .84 (quantitative demands), .79 (emotional demands), .86 (superior support), .88 (workmate support), .75 (performance feedback), .88 (job autonomy), and .72 (growth opportunities).

Work environments overall were significantly related with teaching styles (see Table 3). Job resources in work environments were significantly correlated with teaching styles as anticipated. Three scales (i.e., growth opportunities, learning facilities, and peer morale) were in strong relations with Type I styles. However, job demands in work environments were found to be positively, but negligibly, related with both Type I and Type II styles.

Table 3. Pearson Correlation Coefficients Between Work Environments and Teaching Styles

	1	2	3	4	5	6	7	8	9	10	11
1.Quantitative demands	1.00										
2. Emotional demands	.44*	1.00									
3. Superior support	.08	.01	1.00								
4. Workmate support	.03	.09	.39*	1.00							
5. Performance feedback	.19*	.09	.56*	.36*	1.00						
6. Job autonomy	-.12	-.06	.41*	.34*	.40*	1.00					
7. Growth opportunities	.13*	.06	.45*	.36*	.46*	.44*	1.00				
8. Legislative (I)	.17*	.06	.31*	.36*	.37*	.28*	.46*	1.00			
9. Liberal (I)	.07	.13*	.23*	.42*	.27*	.26*	.39*	.58*	1.00		
10. Executive (II)	.13*	.11	.05	-.02	.15*	.15*	.13*	.05	.03	1.00	
11. Conservative (II)	.12*	.08	.09	.06	.20*	.18*	.20*	.17*	.09	.67*	1.00

As can be seen in Table 4, teaching styles were highly predictable from work environments, with 6-28% of the variability uniquely explained by the latter. A closer look at the significant predictive relationships revealed that, as expected, job resources mostly positively contributed to Type I styles. Four scales of job resources positively contributed to the Type I legislative style. Of these four scales, workmate support and growth opportunities were the major contributors to both the Type I legislative and liberal styles. Job autonomy, however, positively contributed the most to Type II styles (β=.12 and .14; p<.05), which was beyond expectation. Interestingly, on both types of styles, job demands either had no impact at all or showed comparatively negligible impact, if any. Emotional demands, for example, contributed negligibly to the Type I liberal style (β=.11; p<.05).

Table 4. Predicting Teaching Styles from Work Environments

Work environments	Teaching styles			
	Legislative (Type I)	Liberal (Type I)	Executive (Type II)	Conservative (Type II)
R^2_{total}	.31	.26	.12	.11
R^2_{demo}	.03	.03	.06	.04
$R^2_{work\ environments}$	.28	.23	.06	.07
F	16.73***	13.01***	5.19***	4.81***
df	12, 451	12, 451	12, 451	12, 451
$\beta_{quantitative\ demands}$	.12**		.11*	
$\beta_{emotional\ demands}$		.11*		
$\beta_{superior\ support}$				
$\beta_{workmate\ support}$	.22***	.30***		
$\beta_{performance\ feedback}$	.12*			
$\beta_{job\ autonomy}$			.14*	.12*
$\beta_{growth\ opportunities}$	.30***	.25***		

Notes: R^2_{total}=contribution of demographic factors (gender; taught subject; school type; monthly income; grade level taught) and work environments to teaching styles; R^2_{demo}= contribution of demographic factors (gender; taught subject; school type; monthly income; grade level taught) to teaching styles; $R^2_{work\ environments}$=the sole contribution of work environments to teaching styles; **p*<.05, ***p*<.01; ****p*<.001.

Discussion

The present research checked the psychometric properties of the WEIT as a measurement of schoolteachers' perceived work environments. As theoretically expected in the JD-R model (Bakker et al., 2003; Demerouti et al., 2001; Doménech-Betoret et al., 2015), the WEIT justified its conceptualization with good model fit across two studies, where its external construct validity was verified in Study 2 through exploring its association with teaching styles. These findings also empirically confirmed what has been documented in past research examining constructs similar or connected to job demands and resources in corporate settings or in the teaching profession (Alarcon, 2011; de Beer et al., 2012; Tuxford & Bradley, 2015). The WEIT thus proved its viability as a useful tool to measure teachers' work environments together with other well-accepted instruments like the TSTI (Z. Li & B. Li, 2021; Zhang, 2013, 2017). Also, the WEIT showed strong replicability across multiple populations (two independent samples over one year), with alpha reliabilities falling within .72∼.88. The between-item and within-factor internal consistency were supported by the CR. These methods put together help ease worries that the test results in the present research might have capitalized on chances. Also, the WEIT can work well not only in the Chinese context but also with the teaching profession. However, it should be cautioned that differences in language might impact the practicability of the replication of the WEIT in other cultural contexts.

Findings indicated that schoolteachers' perceived work environments significantly contributed to their teaching styles. These findings were in line with Zhang's (2013) argument for an environment-style congruence whereby teachers adopt certain teaching styles in accordance with the demand of their work environments. Therefore, when schoolteachers perceived their work environments as providing abundant opportunities (e.g., in-service training or degree education) for their career development, or perceived their colleagues as being supportive of their creativity-generating teaching practice, they would naturally tend to be comfortable with using Type I teaching styles to deal with such activities as classroom learning, assignment, or extracurricular activities, in order to nurture their students' lateral, higher-order, and creative thinking. Likewise, it is understandable that when facing huge workload or the imposition of extra tasks, the first-year teachers would show a tendency of taking Type II teaching styles for the sake of time and cost saving, such as following topics or methods of teaching that have been proved successful (B. Li & Z. Li, 2021; Zhang, 2013).

Conclusion

The present research aimed to validate a newly constructed tool — the WEIT — to capture the characteristics of teachers' work environments. The WEIT survived two studies using multiple methods. Study 1 focused on preliminary factorial exploration. Almost all items were found to load where they were theoretically expected. One dual-loaded item was detected, and it thus underwent rewording in preparation for Study 2. In Study 2, the WEIT justified its conceptualization again where good model fit was reported using confirmatory factor analysis. More importantly, Study 2 tested the external construct validity of the WEIT by exploring its association with teaching styles. Also, findings were consistent with the theoretical postulates of the JD-R. Empirically, again, these findings confirmed what had been documented in past research examining constructs similar or connected to job demands and resources in corporate settings or in the teaching profession. The WEIT thus proved its viability as a useful tool to measure teachers' work environments in conjunction with other established instruments like the TSTI. It is also reasonable to conclude that appropriate use of the WEIT as a measuring instrument might provide implications for policymakers, teachers, and other key stake holders in the educational settings.

Recommendations

The current research has implications for further and future studies. For example, those interested can attempt to understand teachers' wellbeing and professional development through the JD-R theory. Researchers can also explore the role of school context clustered based on the JD-R model in teachers' professional identity. It is also meaningful and important to examine how job resources might buffer the negative impact of job demands from a longitudinal perspective.

There are also four practical implications for key stakeholders in teacher education and beyond. First, for those interested academic researchers, the present research provides a modified inventory with improved validity and reliability measuring perceived work environments.

The second implication is for policy makers of teacher education. At the university level, the course for career counseling should prepare prospective teachers well for the ideal-reality gap that poses an obstacle for their early career. One way, for example, is to conduct surveys to gain knowledge about prospective teachers' career expectations (e.g., anticipated work environments) or individual particularities (e.g., thinking styles) to which career counseling could be tailored.

The third implication is for school administrators. They should forge supportive and resourceful work environments, where mentorship is fully observed, support from either superiors or colleagues is available, and upward mobility is visible.

The final implication is for first-year teachers. They should be well prepared with relevant solutions in advance. One *generic* solution, for example, is to seek opportunities for professional growth (e.g., degree education, in-service training, seminars or lectures, workshops, and teaching contests) and, when necessary, to seek support from superiors or colleagues concerning lesson plans, teaching expertise, rapport-building skill, career development, and so on.

Limitations

There are still limitations to the present research. For example, female participants dominated the two independent samples. Data in the present research were collected through self-report questionnaire; as a possible result, the connections between constructs might be inflated. Findings from the current research are exploratory, and future replications are needed.

Ethics Statements

The research involving human participants underwent thorough review and approval by the Human Research Ethics Committee at Southwest University. Prior to participating in the study, all participants provided written informed consent, indicating their voluntary agreement to participate.

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Authorship Contribution Statement

Bing Li: Conceptualization, design, analysis, writing. Zheng Li: Editing/reviewing.

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