

## A Mediation Analysis to Detect the Effects of Post-Service Adaptation on Teacher Engagement and Job Satisfaction Using PROCESS and SEM

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### INTRODUCTION

Engagement is a work state in which members of an organization immerse themselves wholeheartedly in their work through self-management, integrate into their job roles, and express their true selves.

Teachers' post-service adaptation involves adjusting and improving their professional attitudes and abilities to achieve a harmonious and unified state with their professional performance and job requirements.

Mediation is a research design in which the third variable, called the mediating variable, intervenes between two related structures. More precisely, in a mediation analysis, researchers examine whether a change in the independent construct results in a change in the mediator variable, which in turn changes the dependent construct in the model.

The purpose of this study aims to compare the mediation effects measured by two different methods to detect the relationship of post-service adaptation on teacher engagement and job satisfaction.

### METHODOLOGY

#### 2.1 Sample

The participants of the study were teachers who had been employed for fewer than 3 years in rural elementary and secondary schools in Guangxi, China. A total of 432 questionnaires were distributed. After excluding invalid questionnaires that did not meet the specifications, 410 valid questionnaires remained, giving a recovery rate of 94.9%.

#### 2.2 Measures of the Constructs

To achieve the research objectives, the teacher engagement scale, the job satisfaction scale and the post-service adaptation scale were adopted in this study. The teacher engagement scale, developed by Klassen et al. (2013), includes four factors: cognitive engagement (CE, 4 items), emotional engagement (EE, 4 items), social engagement of students (SES, 4 items), and social engagement of colleagues (SEC, 4 items) [2]. The job satisfaction scale and the post-service adaptation scale, developed by the researchers *according to literature reviews [10, 20-23]*, the former includes one factor: job satisfaction (JS, 4 items), and the latter includes five factors: educational policy (EP, 5 items), school environment (SE, 5 items), interpersonal relationship (IR, 5 items), psychological quality (PQ, 3 items) and professional ability (PA, 4 items).

#### 2.3 Hypothesis Development

This study developed four hypotheses regarding teacher engagement and two regarding job satisfaction and post-service adaptation. The hypotheses are listed below:

**Hypothesis 1:** Teacher engagement directly affects job satisfaction.

**Hypothesis 2:** Teacher engagement directly affects post-service adaptation.

**Hypothesis 3:** Post-service adaptation directly affects job satisfaction.

**Hypothesis 4:** Teacher engagement indirectly affects job satisfaction through post-service adaptation.

#### 2.4 Data analysis

With the statistical software of SPSS, the PROCESS macro for SPSS, and AMOS, exploratory factor analysis and confirmative factor analysis were utilized to identify the structure of each survey. SEM was implemented to determine the relationship of teacher engagement with job satisfaction. Moreover, the study detected the mediating effects of post-service adaptation on the relationship of teacher engagement with job satisfaction using PROCESS.

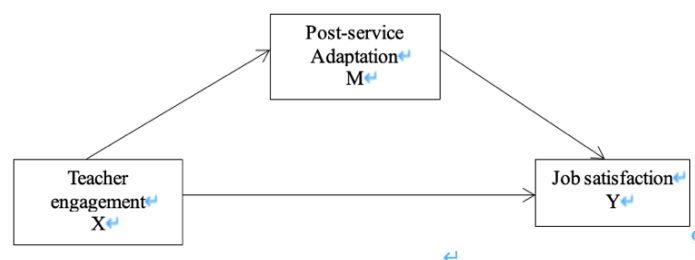


FIGURE 1. Theoretical framework

## RESULTS

### 3.1 Reliability and validity measurements

According to the EFA results for teacher engagement, the factor loadings of all the items in the measure ranged from 0.622 to 0.876 for the teacher engagement scale, thus meeting the threshold (0.50), and demonstrating convergent validity at the item level. The Cronbach's alpha coefficients for the factors of teacher engagement were .86, .86, .86 and .83, with 70.53%, 70.35%, 70.02%, 65.72% of variance explained, respectively. The overall alpha was .95, and the total variance explained was 57.44%. The KMO value was 0.965, and the Bartlett  $\chi^2$ -value was 4254.856 ( $p < 0.000$ ), suggesting that these factors had highly acceptable reliability for assessing teacher engagement.

The job satisfaction scale, the factor loadings of all the items in the measure ranged from 0.800 to 0.872 for the job satisfaction scale, thus meeting the threshold (0.50), and demonstrating convergent validity at the item level. The Cronbach's alpha coefficient for the factor of job satisfaction was .86 with 71.11% of variance explained. The KMO value was 0.821, and the Bartlett  $\chi^2$ -value was 760.489 ( $p < 0.000$ ), suggesting that these factors had highly acceptable reliability for assessing job satisfaction.

According to the EFA results of post-service adaptation, the factor loadings of all the items in the measure ranged from 0.774 to 0.866 for the post-service adaptation scale, thus meeting the threshold (0.50), and demonstrating convergent validity at the item level. The Cronbach's alpha coefficients for the factors of post-service adaptation were .86, .86, .86, .83 and .95, with 68.25%, 71.01%, 65.77%, 72.42%, 67.26% of variance explained, respectively. The overall alpha was .97, and the total variance explained was 62.80%. The KMO value was 0.975, and the Bartlett  $\chi^2$ -value was 6592.012 ( $p < 0.000$ ), suggesting that these factors had highly acceptable reliability for assessing post-service adaptation.

### 3.2 Mediation analysis of post-service adaptation by PROCESS

The PROCESS plug-in was used to analyze the mediation effects, the results of which are summarized in Table 1 and Table 2. The results revealed that the effects of IV teacher engagement on all mediators were significant. In the unique effect of mediator, only the effect of dimension of school environment (SE) was significant, while the effects of the other dimensions were not significant.

TABLE 1. Mediation analysis of post-service adaptation

Mediator	Dimensions	Effect of IV on mediator(a)	Unique effect of mediator(b)	Indirect effect(ab)	BC 95% CI	
					Lower	Upper
post-service adaptation	educational policy (EP)	0.598***	0.115	0.069	-0.0435	0.2029
	school environment (SE)	0.522***	0.293***	0.153	0.0462	0.2712
	interpersonal relationship (IR)	0.553***	-0.131	-0.072	-0.1818	0.0299
	psychological quality (PQ)	0.469***	0.063	0.029	-0.0664	0.1164
	professional ability (PA)	0.473***	0.168*	0.079	0.0007	0.1737
<b>Total</b>				<b>0.258</b>	<b>0.1434</b>	<b>0.4052</b>

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Regarding the indirect effect, by observing the confidence interval, among the five dimensions of the intermediary variable post-service adaptation, only school environment (SE) and professional ability (PA) had significant indirect effects on job satisfaction. Also, the total indirect effect ( $ab = 0.258$ ) of the five dimensions was significant. The total effect of teacher engagement on job satisfaction was 0.518. Among them, the direct effect of teacher engagement on job satisfaction was 0.260, with the relative contribution being 50.2%, and the total indirect effect of teacher engagement through the mediator variable post-service adaptation was 0.258, with the relative contribution being 49.8%. According to the confidence interval shown in Table 2, since the total effect, the direct effect and the total indirect effect were all significant, we can conclude that the mediator variable post-service adaptation had a partial intermediary effect. As expected, the results supported H1, H2, H3 and H4.

TABLE 2. The confirmation of the effects and relative contributions

		BC 95% CI		Relative Contribution
		Lower	Upper	
Total effect of X on Y	0.518	0.4205	0.6151	
Direct effect of X on Y	0.260	0.1606	0.3586	50.2%
Total indirect effect of X on Y	0.258	0.1434	0.4052	49.8%

3.3 Mediation analysis of post-service adaptation by SEM

3.3.1 Results of the measurement model assessment

The findings confirmed that all the item loadings (Cronbach's  $\alpha$ ), composite reliabilities (CRs) and average variance extracted (AVEs) of the first-order and second-order measurement models exceeded the cut-off values of 0.7, 0.8 and 0.5 respectively, ensuring adequate scale reliability [15-16].

For teacher engagement, CR = 0.973 and AVE = 0.692. For job satisfaction, CR = 0.908 and AVE = 0.711. For post-service adaptation, CR = 0.978 and AVE = 0.693. In sum, the first order latent variables had highly acceptable reliability for assessing the second-order latent variables, as shown in Table 3. In addition, the square root of the AVE that exceeded the inter-correlations of the construct with the other constructs in the model was calculated to ensure discriminant validity.

TABLE 3. Construct reliability and validity of the measurement model.

First order	Items	Loadings	CR	AVE	Second order	CR	AVE
cognitive engagement	CE1~CE4	0.803~0.856	0.903	0.700	teacher engagement	0.973	0.692
emotional engagement	EE1~EE4	0.818~0.876	0.905	0.705			
social engagement of students	SES1~SES4	0.789~0.842	0.885	0.657			
social engagement of colleagues	SEC1~SEC4	0.823~0.846	0.905	0.703			
job satisfaction	JS~JS4	0.800~0.872	0.908	0.711	job satisfaction	0.908	0.711
educational policy	EP1~EP5	0.780~0.866	0.915	0.683	post-service adaptation	0.978	0.693
school environment	SE1~SE5	0.828~0.866	0.925	0.710			
interpersonal relationship	IR1~IR5	0.785~0.856	0.906	0.658			
psychological quality	PQ1~PQ3	0.842~0.859	0.887	0.724			
professional ability	PA1~PA4	0.774~0.839	0.891	0.673			

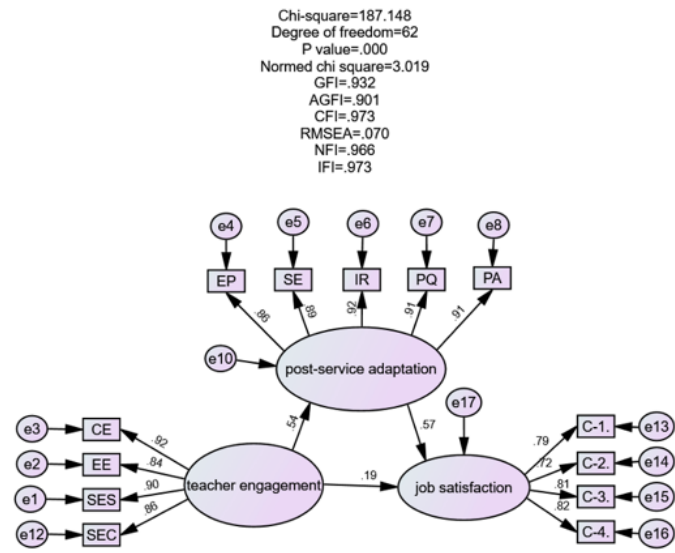
3.3.2 Results of the structural model assessment

The SEM results, along with the recommended values for the common model fit, and the suggested saturated and independence models, are shown in Table 4. Most of the model-fit indices exceeded their respective common acceptance levels as suggested by previous research, thus demonstrating that the default measurement model exhibited a good fit with the data collected (GFI = 0.932, AGFI = 0.901, CFI = 0.973, RMSEA = 0.070, NFI = 0.960, IFI = 0.973). According to the  $\chi^2/df$  index, the  $\chi^2 = 187.148$  and  $df = 62$ , which was not a good fit. This result might have been caused by the small sample in this study. With respect to the scaled non-centrality parameter (SNCP) for small samples, the  $SNCP = (\chi^2 - df)/n = 125.148/410 = 0.305$ , indicating a good fit ( $0.305 \leq 3.00$ ). The parsimony-adjusted measures indicated a parsimonious normed fit index (PNFI) and parsimonious goodness of fit index (PGFI) that exceeded the recommended acceptance levels ( $\geq 0.5$ ). This implies that the suggested model was a good fit.

TABLE 4. Fit indices for the structural and independence models.

Fit indices	Recommended	Default m	Saturated m	Independence m
Model fit summary				
$\chi^2/df$	$\leq 3.00$	3.019	-	60.338
GFI	$\geq 0.80$	0.932	1.000	0.223
AGFI	$\geq 0.80$	0.901	-	0.093
CFI	$\geq 0.90$	0.973	1.000	0.000
RMSEA	$\leq 0.1$	0.070	-	0.381
NFI	$\geq 0.90$	0.960	1.000	0.000
IFI	$\geq 0.90$	0.973	1.000	0.000
Parsimony adjusted measures				
PNFI	$\geq 0.5$	0.763	0.000	0.000
PCFI	$\geq 0.5$	0.773	0.000	0.000
AIC (relative)	smaller	245.148	182.000	4732.348

Properties of the causal paths, including the estimated standardized path coefficients and  $p$ -values for each equation in the hypothesized model, are presented in Table 4 and Figure 2. The number of bootstrap samples was 5,000. The percentile confidence interval was 95%, and the bias-corrected confidence interval was 95%. As expected, the results supported H1, H2, H3 and H4 ( $\gamma = 0.185, p < 0.001$ ;  $\gamma = 0.545, p < 0.001$ ;  $\gamma = 0.572, p < 0.001$ ;  $\gamma = 0.313, p < 0.001$ , respectively).



Note. First order path significance:  $p < 0.05$ . Second order path significance:  $p < 0.05$ . Parentheses indicate R<sup>2</sup> values.

FIGURE 2. Structural model path coefficients

## CONCLUSIONS

Through regression analysis of the mediating effects of this study, we provide a basis for empirical research on the construction of newly recruited teachers. We can propose explanatory models for the mediating effects of five influencing factors on job satisfaction, including educational policy, school environment, interpersonal relationships, psychological quality, and professional ability. The findings indicated that: (1) There is a significant difference in the impact of job engagement and job adaptation on job satisfaction among newly recruited teachers in rural areas; (2) There is a significant positive correlation between job engagement, post-service adaptation, and job satisfaction of newly recruited teachers in rural areas; and (3) Post-service adaptation is a mediating factor that affects job engagement and job satisfaction. One of the effective ways to improve job satisfaction for new teachers is therefore to intervene in their post-service adaptation.

Further, PROCESS certainly has merit for estimating mediation and conditional processes in regression-based models with single-item observable variables. However, PROCESS is subject to the limitations of handling complex cause-effect models with latent variables [17]. Most studies clearly speak in favor of using SEM in a complex model with latent variables (e.g., Hayes et al., 2017 [17]; Iacobucci et al., 2007 [18]; Pek & Hoyle, 2016 [19]; Sarstedt et al., 2020 [14]). This study used multiple mediating variables through SEM to perform mediating analysis tests on second-order models, providing a better explanation of the validation of hypothetical models. Also, SEM practically plays a dominant analytical approach in a mediation analysis. Researching the efficacy of these two approaches in predictive comparisons of mediation models would be highly useful. Hair et al. (2011) explained that Partial least squares structural equation modeling (PLS-SEM) can indeed be a “silver bullet” for estimating causal models in many theoretical model and empirical data situations [24]. It is suggested that researchers should estimate causal models by PLS-SEM for the future research.