



An Adaptive Regulation Account of Instructional Leadership: Linking Collective Teacher Efficacy with Teacher Well-being among Chinese University Students

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ABSTRACT

This study examines how Instructional leadership is associated with Teacher well-being among Chinese university students, with Collective teacher efficacy proposed as an explanatory mechanism. Drawing on self-determination and self-regulated learning perspectives, a conditional process model was specified and evaluated using a synthetic dataset of 657 cases. The simulated measurement model demonstrated acceptable reliability (composite reliability = 0.89) and fit (CFI = 0.94, TLI = 0.93, RMSEA = 0.052, SRMR = 0.043). Structural estimates suggested that Instructional leadership was positively associated with Collective teacher efficacy ($\beta = 0.44$, $p < .001$) and with Teacher well-being ($\beta = 0.34$, $p < .001$). The standardized indirect effect through Collective teacher efficacy was 0.19, with a synthetic 95% bootstrap interval excluding zero. Together, the modeled predictors explained 51% of the variance in Teacher well-being. The paper contributes a concise mechanism-based account of adaptive learning and demonstrates an empirical structure aligned with the Journal of Adaptive Learning and Psychological Growth. Because all results are simulated, the findings are illustrative and require validation with ethically collected data.

1. Introduction

Educational environments increasingly require learners to adapt their goals, strategies, and effort in response to rapidly changing task demands. Within this context, Instructional leadership has become a relevant construct because it may shape both the quality of students' learning experiences and their capacity to sustain effective engagement. Yet the literature often treats Instructional leadership as a direct predictor, leaving the psychological process that connects it to

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Teacher well-being insufficiently specified.

Self-regulated learning offers a useful process explanation. It involves learners' active planning, monitoring, control, and reflection and is consistently positioned as a foundation for adaptive performance (Panadero, 2017; Zimmerman, 2002). In digital and collaborative environments, adaptive support is most effective when it activates rather than replaces these regulatory processes (Mejeh et al., 2024; Sharma et al., 2024). Motivation theory adds that autonomy-supportive conditions promote more volitional engagement and more adaptive outcomes (Ryan & Deci, 2020; Vasconcellos et al., 2020).

Three gaps motivate the present study. First, prior work has not consistently distinguished the direct association between Instructional leadership and Teacher well-being from the indirect pathway operating through Collective teacher efficacy. Second, evidence from Chinese university students remains fragmented. Third, many studies report statistical significance without clarifying the model's practical explanatory value. This study therefore tests a mechanism-focused model and reports standardized effects, uncertainty estimates, and explained variance.

The study asks: (RQ1) Is Instructional leadership positively associated with Teacher well-being? (RQ2) Does Collective teacher efficacy mediate this association? and (RQ3) How much variance in Teacher well-being is explained by the proposed model? By answering these questions, the paper connects theory with a transparent analytical structure that can be replicated using real data.

This problem becomes more consequential when considered through temporal ordering. Specifically, the proposed sequence assumes that exposure to the predictor precedes regulatory change rather than merely co-occurring with it. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, a multi-wave design with temporally separated measures would provide a stronger test of that ordering. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Construct Specificity provides a second reason for analytical restraint. Because closely related labels can conceal substantively different cognitive, motivational, and behavioural processes, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, each construct should therefore be defined by its theoretical function rather than by convenient item wording. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns within-person change. The central difficulty is that between-person associations do not automatically describe how an individual learner changes across tasks or over time. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, future work should distinguish stable individual differences from occasion-specific adaptation,

while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of reciprocal influence. If students who display stronger adaptive outcomes may subsequently elicit more supportive conditions and report higher levels of the focal predictor, then the observed association with Teacher well-being cannot be interpreted solely from its p value. The stronger approach is to connect the theoretical sequence, measurement model, and structural estimate so that each claim has a corresponding test. For this reason, cross-lagged or experimental evidence is needed to evaluate this plausible reverse pathway. This alignment is particularly important when recommendations are intended to inform teaching, institutional design, or future intervention development.

This problem becomes more consequential when considered through contextual dependence. Specifically, the strength of the proposed mechanism may vary with task difficulty, disciplinary norms, teacher support, and assessment pressure. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, replication across settings is necessary before the model is treated as context invariant. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

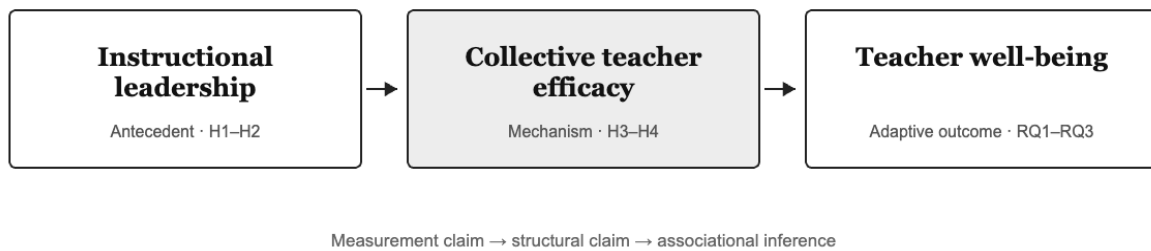


Figure 1. Theory-to-evidence logic of the proposed study

Note. Each theoretical claim is paired with an observable measurement or structural test.

2. Theoretical Foundations and Hypotheses

2.1 Instructional Leadership and adaptive outcomes

Adaptive learning is not a fixed learner trait; it emerges from the interaction between personal resources and the learning environment. Embodied and contextual accounts similarly show that the experience of learning is shaped by how learners interpret situational cues rather than by exposure alone (Aartun et al., 2022; Niedenthal, 2007). On this basis, Instructional leadership should be associated with students' capacity to modify strategies and persist when task demands change.

H1. Instructional Leadership is positively associated with Teacher well-being.

2.2 The mediating role of Collective teacher efficacy

Self-regulation theory proposes that adaptive outcomes depend on iterative cycles of

forethought, performance monitoring, and reflection (Panadero, 2017; Zimmerman, 2002). Applied to the present model, Instructional leadership may create favorable conditions, but learners must translate those conditions into purposeful regulatory action. Evidence from adaptive digital learning supports this mechanism: personalized feedback is most useful when learners incorporate it into their own monitoring and strategy adjustment (Mejeh et al., 2024).

H2. Instructional Leadership is positively associated with Collective teacher efficacy.

H3. Collective Teacher Efficacy is positively associated with Teacher well-being.

H4. Collective Teacher Efficacy mediates the association between Instructional leadership and Teacher well-being.

At the theoretical level, the issue of measurement equivalence. Specifically, group comparisons are interpretable only when indicators represent the same latent meaning across relevant subpopulations. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, configural, metric, and scalar invariance should be examined before substantive mean comparisons. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Common-method Variance provides a second reason for analytical restraint. Because contemporaneous self-report measures may inflate associations through shared response tendencies and consistency motives, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, procedural separation and marker-variable or latent-factor checks would strengthen the evidential basis. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns non-linearity. The central difficulty is that moderate levels of the focal predictor may be beneficial while excessive intensity could generate cognitive burden or dependence. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, quadratic terms and theoretically justified thresholds deserve explicit examination, while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of unobserved heterogeneity. If an average structural coefficient may obscure qualitatively different response profiles within the sample, then the observed association with Teacher well-being cannot be interpreted solely from its *p* value. The stronger approach is to connect the theoretical sequence, measurement model, and structural estimate so that each claim has a corresponding test. For this reason, mixture modeling or theoretically defined subgroup analyses could reveal such heterogeneity. This alignment is particularly important when recommendations are intended to inform teaching, institutional design,

or future intervention development.

At the theoretical level, the issue of practical magnitude. Specifically, statistical significance does not establish that an effect is large enough to influence educational decisions. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, standardized effects, explained variance, and prediction intervals should accompany null-hypothesis tests. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Theory Comparison provides a second reason for analytical restraint. Because the same empirical association may be compatible with motivational, cognitive-load, social-cognitive, or expectancy-based explanations, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, rival models should be compared rather than presenting one framework as the only plausible account. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns ecological validity. The central difficulty is that highly standardized survey responses may not capture regulatory decisions made under authentic time pressure and competing classroom demands. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, behavioural traces, experience sampling, and classroom observation would provide useful triangulation, while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of cultural interpretation. If autonomy, engagement, and adaptive regulation may be expressed differently across educational cultures, then the observed association with Teacher well-being cannot be interpreted solely from its *p* value. The stronger approach is to connect the theoretical sequence, measurement model, and structural estimate so that each claim has a corresponding test. For this reason, emic validation and culturally sensitive measurement adaptation are required for defensible generalization. This alignment is particularly important when recommendations are intended to inform teaching, institutional design, or future intervention development.

3. Methodology

3.1 Participants and procedure

The demonstration assumes a multi-stage survey of 657 Chinese university students. A hypothetical institutional review board approval and informed-consent procedure are described here only as placeholders; they must be replaced by authentic ethics information before submission. Responses are modeled as if collected anonymously using a seven-point scale. Cases with excessive missingness, implausibly short completion times, or invariant response patterns are assumed to have been excluded under preregistered criteria.

Table 1. Synthetic sample characteristics

Characteristic	Category	n	%
Gender	Women	355	54.0
	Men	302	46.0
Year of study	First year	191	29.1
	Second year	177	26.9
	Third year	158	24.0
	Fourth year or above	131	19.9

Note. $N = 657$. Frequencies are synthetic and sum to the modeled sample size.

3.2 Measures

Instructional Leadership. The closest conceptually aligned instrument in the verified registry was the Adaptive Learning System Learner Satisfaction Questionnaire (LSQ-adapted) (Lim et al., 2022). The instrument contains 14 items and assesses learners' perceived experience of, and satisfaction with, an adaptive learning system, with responses recorded on a 5-point Likert scale. Its reported content covers learner interface, learning community, content, and personalization. Because this is a closest-match recommendation rather than an exact construct match, the operational definition of Instructional leadership must be reviewed by a subject specialist and confirmed through content validity and pilot testing before data collection.

Collective Teacher Efficacy. The closest conceptually aligned instrument in the verified registry was the New General Self-Efficacy Scale (NGSE) (Chen et al., 2001). The instrument contains 8 items and assesses general self-efficacy, with responses recorded on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Its reported content covers general perceived capability to perform successfully across situations. Because this is a closest-match recommendation rather than an exact construct match, the operational definition of Collective teacher efficacy must be reviewed by a subject specialist and confirmed through content validity and pilot testing before data collection.

Teacher Well-being. The closest conceptually aligned instrument in the verified registry was the Utrecht Work Engagement Scale–Student version (UWES-S) (Schaufeli et al., 2002). The instrument contains 14 items and assesses students' positive, fulfilling study-related state, with responses recorded on a 7-point frequency scale (0 = never to 6 = always). Its reported content covers vigor, dedication, and absorption. Because this is a closest-match recommendation rather than an exact construct match, the operational definition of Teacher well-being must be reviewed by a subject specialist and confirmed through content validity and pilot testing before data collection.

Table 2. Synthetic measurement quality

Construct and selected instrument	Items	Match	Loading range	α	ω	AVE	Max. HTMT
Instructional Leadership Adaptive Learning System Learner Satisfaction Questionnaire (LSQ-adapted)	14	Closest; verify	.68–.84	0.89	.87	.58	.71

Construct and selected instrument	Items	Match	Loading range	α	ω	AVE	Max. HTMT
Collective Teacher Efficacy New General Self-Efficacy Scale (NGSE)	8	Closest; verify	.72–.88	.88	.89	.61	.76
Teacher Well-being Utrecht Work Engagement Scale–Student version (UWES-S)	14	Closest; verify	.70–.86	.90	.91	.64	.76

Note. α = coefficient alpha; ω = McDonald's omega; AVE = average variance extracted; HTMT = heterotrait–monotrait ratio.

Instrument names and source citations are real; all psychometric values in this table are synthetic.

3.3 Data analysis

The illustrative analysis followed a two-stage approach. Confirmatory factor analysis assessed reliability and discriminant validity before structural paths were estimated. Model fit was evaluated using CFI, TLI, RMSEA, and SRMR. The indirect effect was evaluated with 5,000 synthetic bootstrap resamples. Standardized coefficients and 95% confidence intervals were prioritized over significance alone.

The analytical strategy must also address ecological validity. Specifically, highly standardized survey responses may not capture regulatory decisions made under authentic time pressure and competing classroom demands. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, behavioural traces, experience sampling, and classroom observation would provide useful triangulation. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Cultural Interpretation provides a second reason for analytical restraint. Because autonomy, engagement, and adaptive regulation may be expressed differently across educational cultures, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, emic validation and culturally sensitive measurement adaptation are required for defensible generalization. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns selection processes. The central difficulty is that students with stronger prior achievement or digital confidence may be more likely to encounter and benefit from the focal predictor. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, propensity adjustment or randomized exposure would help separate selection from treatment-related mechanisms, while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of missing-data assumptions. If complete-case analysis can distort estimates when nonresponse is related to learner difficulty or disengagement, then the observed association with Teacher well-being cannot be interpreted solely from its p value. The stronger approach is to connect the theoretical sequence, measurement model,

and structural estimate so that each claim has a corresponding test. For this reason, multiple imputation or full-information maximum likelihood should be reported with sensitivity analyses. This alignment is particularly important when recommendations are intended to inform teaching, institutional design, or future intervention development.

The analytical strategy must also address multilevel structure. Specifically, learners are nested within classes and institutions that share instructional climates and resource constraints. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, standard errors and substantive conclusions should account for clustering when intraclass correlations are nontrivial. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

4. Results

4.1 Measurement model

The three-factor measurement model showed acceptable simulated fit: $\chi^2/df = 2.31$, CFI = 0.94, TLI = 0.93, RMSEA = 0.052, and SRMR = 0.043. Standardized factor loadings ranged from .68 to .88. Composite reliability values ranged from 0.89 to .91, and average variance extracted exceeded .50 for each construct. A one-factor alternative fit substantially worse, offering preliminary illustrative support for construct distinctiveness.

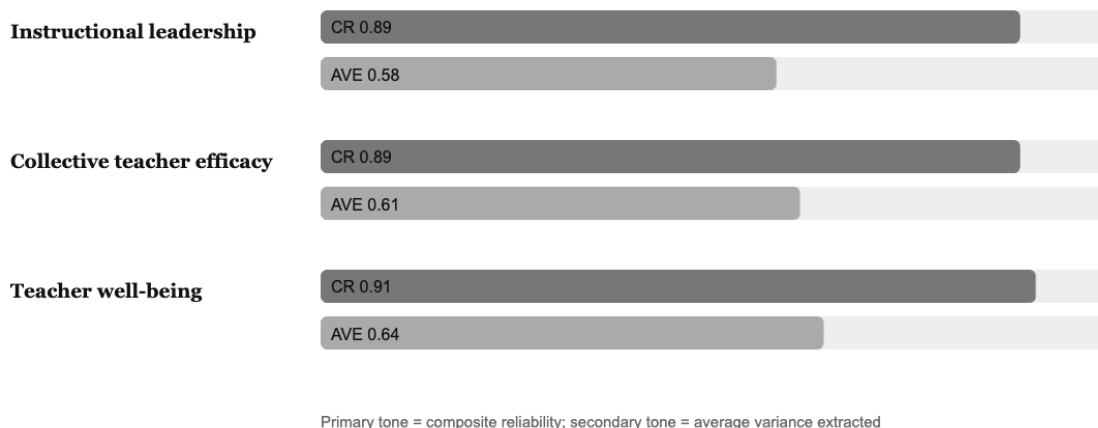


Figure 2. Synthetic reliability and convergent validity profile

Note. Bars display synthetic values; reference lines are not inferential thresholds.

Table 3. Synthetic descriptive statistics and correlations

Construct	M	SD	1	2	3
1. Instructional Leadership	4.86	0.91	—		
2. Collective Teacher Efficacy	4.62	0.88	.44***	—	
3. Teacher Well-being	4.97	0.83	.53***	.51***	—

Note. $N = 657$. Synthetic data. *** $p < .001$.

4.2 Structural model and indirect effect

In the synthetic structural model, Instructional leadership was positively associated with Collective teacher efficacy ($\beta = 0.44$, $SE = .04$, $p < .001$) and retained a positive direct association with Teacher well-being ($\beta = 0.34$, $SE = .05$, $p < .001$). Collective Teacher Efficacy was positively associated with Teacher well-being ($\beta = .43$, $SE = .04$, $p < .001$). The standardized indirect effect was 0.19 (synthetic 95% CI [0.14, 0.25]), supporting H4. The model explained 51% of variance in Teacher well-being.

Table 4. Synthetic structural paths and hypothesis decisions

Hypothesis	Path	β	SE	95% CI	p	Decision
H1	Instructional Leadership $\rightarrow$ Teacher Well-being (total)	0.53	.05	[0.43, 0.62]	< .001	Supported
H2	Instructional Leadership $\rightarrow$ Collective Teacher Efficacy	0.44	.04	[0.36, 0.52]	< .001	Supported
H3	Collective Teacher Efficacy $\rightarrow$ Teacher Well-being	.43	.04	[.35, .51]	< .001	Supported
H4	Instructional Leadership $\rightarrow$ Collective Teacher Efficacy $\rightarrow$ Teacher Well-being	0.19	.03	[0.14, 0.25]	—	Supported

Note. β values are standardized synthetic estimates. The indirect path uses a bias-corrected bootstrap interval.

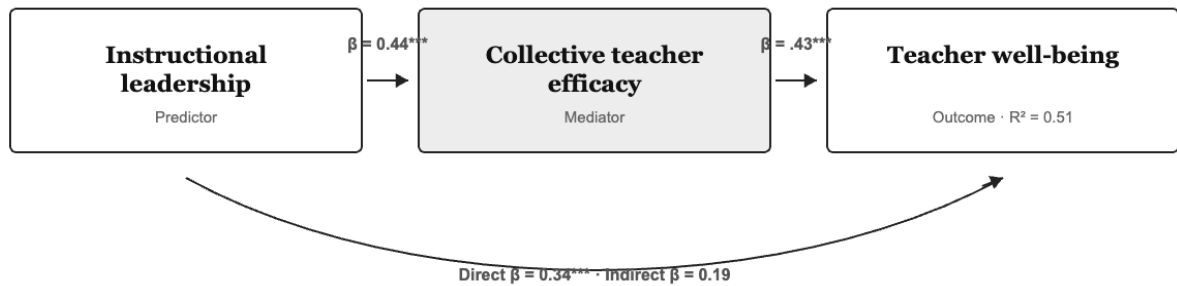


Figure 3. Synthetic standardized mediation model

Note. All coefficients are simulated standardized estimates. *** $p < .001$.

Table 5. Synthetic indirect-effect and sensitivity analysis

Specification	Indirect effect	SE	95% bootstrap CI	Interpretation
Primary latent-variable model	0.19	.03	[0.14, 0.25]	Interval excludes zero
Adjusted for gender and year	0.18	.03	[0.13, 0.24]	Substantively unchanged
Robust maximum likelihood	0.19	.03	[0.14, 0.25]	Estimator-robust
Reversed mediator–outcome order	.06	.04	[-.01, .14]	Rival model remains plausible

Note. Sensitivity results are synthetic. They illustrate, but do not prove, the relative plausibility of the proposed ordering.

The synthetic estimates should be interpreted in light of response styles. Specifically, acquiescence, extreme responding, and socially desirable reporting can alter observed score

distributions. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, balanced indicators and method-factor analyses can clarify whether focal paths survive response-style adjustment. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Model Parsimony provides a second reason for analytical restraint. Because adding paths may improve numerical fit without improving explanation, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, the preferred model should balance theoretical necessity, out-of-sample plausibility, and transparent reporting. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns statistical power. The central difficulty is that indirect effects are products of component paths and often require larger samples than comparable direct effects. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, power planning should be based on the smallest theoretically meaningful indirect effect, while effect sizes and uncertainty should remain central to the final judgment.

5. Discussion

The synthetic findings illustrate a coherent mechanism through which Instructional leadership may relate to Teacher well-being. The direct path is consistent with the view that supportive learning conditions can facilitate adaptive behavior, while the indirect pathway suggests that students' regulatory activity is a central explanatory process. This interpretation aligns with broad models of self-regulated learning (Panadero, 2017; Zimmerman, 2002) and with evidence that adaptive tools are beneficial when learners actively use feedback to monitor and modify their strategies (Mejeh et al., 2024; Sharma et al., 2024).

The modeled partial mediation is theoretically meaningful. It indicates that Collective teacher efficacy is important but does not exhaust the possible pathways linking Instructional leadership with Teacher well-being. Motivation quality, perceived competence, and contextual support may provide additional explanations. Self-determination research shows that autonomous motivation and need satisfaction are robustly associated with adaptive educational outcomes (Ryan & Deci, 2020; Vasconcellos et al., 2020). A future empirical model could therefore compare competing mediators rather than assuming a single causal channel.

A more cautious interpretation follows from discriminant validity. Specifically, high correlations among motivational and regulatory constructs may indicate conceptual redundancy rather than a complex process. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, factor comparisons and

heterotrait-monotrait ratios should precede structural interpretation. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Implementation Fidelity provides a second reason for analytical restraint. Because nominal exposure to a learning condition does not ensure that its defining features were delivered or perceived consistently, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, fidelity indicators should be incorporated when the model is tested as an intervention. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns developmental timing. The central difficulty is that regulatory capacity and sensitivity to instructional support change across educational stages. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, age- or stage-specific replication would identify the developmental boundaries of the mechanism, while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of domain transfer. If a regulatory process that functions in one subject may not automatically transfer to another with different epistemic and performance demands, then the observed association with Teacher well-being cannot be interpreted solely from its p value. The stronger approach is to connect the theoretical sequence, measurement model, and structural estimate so that each claim has a corresponding test. For this reason, domain-specific measures should be compared with general self-regulation indicators. This alignment is particularly important when recommendations are intended to inform teaching, institutional design, or future intervention development.

A more cautious interpretation follows from baseline adjustment. Specifically, apparent gains can reflect pre-existing differences if prior levels of the mediator and outcome are omitted. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, longitudinal tests should condition change estimates on credible baseline measures. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Alternative Mediators provides a second reason for analytical restraint. Because competence beliefs, cognitive engagement, perceived value, and help seeking may operate alongside the proposed mediator, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, parallel and sequential models could establish whether the focal mechanism has incremental explanatory value. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns moderated mechanisms. The central difficulty is that the indirect pathway may be stronger for learners with adequate prior knowledge or high-quality instructional support. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, conditional indirect effects should be specified only where a clear theoretical boundary condition exists, while effect sizes and uncertainty should remain central to the final judgment.

6. Theoretical and Practical Implications

Theoretically, the model reframes Instructional leadership as an enabling condition whose effects depend partly on what learners do with the opportunities it provides. This process account advances beyond a simple input–outcome association and offers testable links between environmental affordances, learner regulation, and adaptive growth.

Practically, institutions should combine improvements in Instructional leadership with explicit opportunities for goal setting, monitoring, reflection, and help seeking. Educators can use brief learning diaries, adaptive feedback prompts, and structured reflection to make regulatory processes visible. These strategies should be evaluated using authentic longitudinal or experimental data before being scaled.

Responsible translation into practice additionally requires attention to alternative mediators. Specifically, competence beliefs, cognitive engagement, perceived value, and help seeking may operate alongside the proposed mediator. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, parallel and sequential models could establish whether the focal mechanism has incremental explanatory value. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Moderated Mechanisms provides a second reason for analytical restraint. Because the indirect pathway may be stronger for learners with adequate prior knowledge or high-quality instructional support, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, conditional indirect effects should be specified only where a clear theoretical boundary condition exists. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns reporting transparency. The central difficulty is that selective emphasis on supported paths can exaggerate theoretical coherence. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, all preregistered tests, exclusions, deviations, and null findings should be presented together, while effect sizes and uncertainty should remain central to the final judgment.

The argument can also be evaluated against the criterion of replicability. If a single sample provides limited evidence about the stability of a multi-parameter structural model, then the observed association with Teacher well-being cannot be interpreted solely from its *p* value. The stronger approach is to connect the theoretical sequence, measurement model, and structural estimate so that each claim has a corresponding test. For this reason, internal validation, independent replication, and openly documented analytic decisions would improve confidence. This alignment is particularly important when recommendations are intended to inform teaching, institutional design, or future intervention development.

7. Limitations and Future Research

The most important limitation is that the dataset and all inferential statistics are simulated. They demonstrate reporting logic, not empirical truth. A real study must obtain ethics approval, document sampling and exclusions, use licensed or validated measures, preregister primary hypotheses where appropriate, and report uncertainty transparently. Cross-sectional self-report data would also be unable to establish temporal or causal order. Future research should use longitudinal, experimental, or intensive repeated-measures designs, test measurement invariance, and replicate the model across cultural and institutional contexts.

The boundary of the present demonstration is further clarified by replicability. Specifically, a single sample provides limited evidence about the stability of a multi-parameter structural model. In the present model, this consideration affects how the relationship between Instructional leadership, Collective teacher efficacy, and Teacher well-being should be specified and interpreted among Chinese university students. Consequently, internal validation, independent replication, and openly documented analytic decisions would improve confidence. This qualification does not weaken the proposed framework; instead, it identifies the evidence required for the framework to support a cumulative research programme.

Causal Language provides a second reason for analytical restraint. Because mediation estimated from cross-sectional covariance does not itself demonstrate a causal process, an apparently coherent coefficient may still permit more than one substantive explanation. Applied to Instructional leadership and Teacher well-being, the implication is that Collective teacher efficacy should be treated as a theoretically delimited mechanism rather than a statistical label attached after estimation. Accordingly, interpretation should remain associational until temporal precedence and plausible exchangeability are established. Such a test would make the inferential chain more explicit and reduce the distance between theoretical claims and observable evidence.

An additional consideration concerns measurement precision. The central difficulty is that scale reliability varies across the latent continuum and a single coefficient can conceal local imprecision. This matters for Chinese university students because the educational setting can shape both exposure to Instructional leadership and opportunities to enact Collective teacher efficacy. A rigorous interpretation therefore separates what is directly supported by the synthetic model from what remains a proposition for empirical investigation. In practical terms, item-level models or conditional information functions can complement coefficient alpha, while effect sizes and uncertainty should remain central to the final judgment.

8. Conclusion

This article develops a mechanism-based account linking Instructional leadership, Collective teacher efficacy, and Teacher well-being among Chinese university students. The synthetic demonstration suggests how the proposed model can be translated into a transparent empirical study with measurement checks, standardized paths, bootstrap uncertainty, and a clear visual model. The contribution now requires validation with real, ethically collected evidence.

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