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How Distributed leadership Fosters Teacher Innovation: A Mediation Analysis of Self-efficacy and Professional Learning Communities

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Abstract

This research examines the links between distributed leadership and educator innovative behaviour, particularly as mediated by teacher self-efficacy and professional learning communities (PLCs), in junior high schools. The research draws on Social Cognitive Theory and Organisational Learning Theory, and considers a two-pronged model incorporating both psychological and organisational processes. This study utilized a quantitative approach, and information was gathered from teachers through a questionnaire. Partial Least Squares Structural Equation Modelling in SmartPLS was employed to analyse the data. Results show that distributed leadership is positively associated with teacher innovation behaviour. Moreover, the Teacher Self-efficacy and PLCs is also a key mediator, suggesting that leadership drives innovation by boosting teachers' beliefs and fostering a culture of learning. The findings support partial mediation effects, underscoring the interaction between the individual and the group practices in promoting innovation. Our method adds to the existing body of related work by incorporating two mediators into a single model and offering empirical evidence. This research provides insights for Policymakers and school administrators to promote distributed leadership, improve the Teacher Self-efficacy, and establish professional learning communities to support innovative teaching practices.

Keywords: Distributed leadership, teacher innovative behaviour, self- efficacy, mediation analysis, educational leadership.

1. Introduction

In the past few years, schools around the globe have placed more focus on the need for shared and distributed forms of leadership to enhance the teaching quality and the success of students. More active styles of leadership, including distributed leadership, are slowly taking the place of traditional styles that focus on hierarchical decision-making and principal-driven authority. In this changing world, teacher self-efficacy has become an important psychological concept that affects how teachers educate, how they work, and how they come up with new ideas for teaching. Distributed leadership has been recognised as an important aspect in teacher empowerment, facilitating teachers' involvement in decision-making processes and promoting development (Gong, 2025; Wang et al., 2025). (PLCs). Similarly, Wang et al. (2025) found that distributed leadership models enable teacher collaboration to positively affect teachers' professional well-being, and self-confidence is a key mediator. Xie et al. (2022) found that principal leadership influences the Teacher Self-efficacy through collaborative processes, emphasising the importance of facilitating collaborative interactions among teachers in schools. Distributed leadership fosters instructional innovation through the chain mediation model proposed by Zhao et al. (2025), which involves educator commitment and collaboration. This is another example of the value of synergy for enhancing learning.

Pan's (2023) research shows that being a part of teacher education communities greatly boosts self-confidence, which in turn encourages teaching techniques that focus on the needs of the student. Lin (2022) discovered that distributed leadership increases the inventiveness of teachers by means of autonomy and professional collaboration as mediating factors. This illustrates how the organisational and psychological aspects intertwine to shape teachers' actions. Similarly, Xiu et al. (2022) demonstrated that distributed leadership boosts teachers' willingness for change and enhances their job satisfaction through PLCs. Another example of how leadership impacts teachers in a variety of ways.

Much research has also been conducted on ways in which leadership might influence the teacher to become more inclusive and creative. Wang et al. (2022) reported that both Distributed leadership and leadership by teachers are beneficial to increase teachers' confidence in an inclusive education environment. Distributed leadership has a significant influence on teacher satisfaction with their work and self-confidence, and cooperation is an intervening variable between them, according to Fan and Chu (2025). Although the research on this topic is growing, further research is needed to understand the relationships between distributed leadership, collaborative practices, and the Teacher Self-efficacy. While the current research provides much information on individual connections, there is less information available about the interactions between various aspects of integrated frameworks.

1.1 Research Problem

A number of important gaps remain in the literature on Teacher Self-efficacy, distributed leadership, and PLC. Current research mainly focuses on direct interactions, with a lack of studies exploring complex mediation pathways that also involve teacher cooperation, autonomy, and self-confidence (Gong, 2025; Zhao et al., 2025). When mediation is considered, outcomes can range from outcomes such as innovation, work satisfaction, and well-being, indicating the need for more comprehensive models. Second, the Teacher Self-efficacy is known to be an important mediator variable, but its role in different organisational settings remains under-explored. There is some literature that suggests that there is a strong mediating role of self-confidence between leadership and job-related outcomes (Liu et al., 2023). This mismatch highlights how some contextual factors (school environment, institutional structure, and cultural standards) affect the nature and extent of these connections.

2. Related Work

The majority of recent research has improved the comprehension of the correlation between distributed leadership, PLC, and Teacher Self-efficacy in affecting various teacher and student outcomes. The Professional Learning Community is known as one of the best structures for enhancing the Teacher Self-efficacy and professional development. The teacher learning communities, however, have a significant effect on the confidence level and the learning outcomes of teachers, particularly those who employ theory-based evaluation models, as demonstrated by Pan and Cheng (2023). Furthermore, Zheng and Yin (2020) provided multi-level evidence of how involvement in Professional Learning Communities (PLCs) contributes to improving teachers' self-confidence and commitment, emphasising the importance of collaborative models in building ongoing teacher engagement. Based on this study, Zheng and Luo (2024) demonstrated that departmental-level PLCs have a significant impact on the Teacher Self-efficacy along with the teacher leadership, suggesting that localised and context-specific collaboration can be particularly effective.

Transformational leadership, specifically, has been recognised as a basic facilitating factor of collaborative learning environments. Windasari et al. (2025) found that transformational leadership indirectly affects innovative teaching through the mediator of Professional Learning Communities (PLCs), Teacher Self-efficacy, and teacher motivation. In a similar manner, Gao et al. (2024) indicated that transformational leadership helps the operation of PLCs in Chinese educational institutions, consequently facilitating teacher collaboration and professional development. These findings indicated that there is an additional impact of leadership approaches on the way in which organisations are set up, but also on the way in which they operate during collaborative processes and on what they accomplish. The synergy between distributed leadership and teacher well-being is also a topic of interest. Liu et al. (2023) explored the relationships among distributed leadership ,

self-confidence, and well-being and concluded that self-confidence is a key psychological process through which the impact of distributed leadership on positive teacher outcomes is mediated. Similarly, Abdullah et al (2025) emphasised that Teacher Self-efficacy mediated the relationship between PLCs and collective teacher efficacy, suggesting that personal attitudes could significantly impact collective perceptions in education.

Based on current evidence, the impact of leadership practices and collaborative structures on various outcomes such as innovation, well-being, commitment, and resilience can be understood through the Teacher Self-efficacy. Although there has been a lot of success in explaining these links, the increasing focus on mediated and multilevel models suggests additional research is necessary to completely understand all aspects of the relationships among these factors. A synthesis of leadership theory, professional learning, and psychology can help us to understand how one can help teachers to grow in today's classroom. The key literature summarised in Table 1 in Appendix includes research aims, methods, and findings.

2.1 Research Gaps

Also, a major limitation is that there is a high reliance on cross-sectional and single-source data. While robust, many studies employing structural equation modelling (SEM) have been based on datasets such as TALIS that limit the causal interpretation and longitudinal understanding (Lin, 2022; Xie et al., 2022). Although there are a few longitudinal studies and some mixed-method studies, there is a minimal number of these studies to capture the complete pattern of the development of Teacher Self-efficacy in different contexts of leadership and community over time. Although diverse factors such as teacher well-being and innovation are now part of the studies, there is limited integration of psychological (P), organisational (O), and behavioural (B) aspects into one model (Wang et al., 2025; Fan & Chu, 2025). This indicates the need for more detailed and theory-driven models that depict the various facets of teachers' development. Overall, the research remains fragmented, and there are only a few general models that address all three concepts of distributed leadership , PLCs, and Teacher Self-efficacy. Filling in these gaps can offer an improved understanding of the influence of leadership and collaboration on teacher outcomes.

3. Methodology

3.1 Research Design

The study adopted the quantitative approach in studying a survey on cross-sectional research design, and distributed leadership, teacher innovative behaviour was the dependent variable, teachers' self-confidence, and professional development communities (PLCs) were the mediators. The quantitative approach was deemed suitable as the study was designed to test hypothesised relationships between the latent constructs that were to be measured with the use of statistical modelling techniques. The data was analysed using the PLS-SEM technique in SmartPLS

software, which was suitable for analysing the data in the present study due to the use of a complex mediation model and multidimensional constructs.

3.2 Dataset Description

The data set is likely a structured questionnaire data set from junior high school teachers in Kunming, China, intended to assess several latent variables involving leadership and innovation in education. The dataset is probably structured in a tabular format (Excel) with every row representing a teacher participant and columns representing items from the questionnaire, rated using a Likert scale (usually 1-5 or 1-7). The data includes four key constructs, namely, distributed leadership, Teacher Self-efficacy, PLC and creative behaviour of educators, which are each measured using several observed variables. Moreover, the constructs are conceptualised as higher-order variables, which means that each is comprised of multiple sub-constructs (for instance, distributed leadership is comprised of participative decision-making and leadership collaboration, and innovative behaviour is comprised of idea generation and idea realisation). Hence, the dataset is appropriate for multivariate statistical analyses, such as SmartPLS Structural Equation Modelling (SEM), which allows analysis of direct and indirect associations among constructs.

3.3 Study Design and Theoretical Framework

This study is based on Social Cognitive Theory, which suggests that people's beliefs about their capabilities to perform a task affect their behaviour and performance, and Theory on Organisational Learning, which highlights the role of collective learning and collaborative settings in improving organisational effectiveness and innovation. In this context, distributed leadership is viewed as a participative model of leadership that encourages individual psychological empowerment (Teacher Self-efficacy) and organisational collaboration (PLCs).

3.4 Target Population, Sample and Data Collection

The population includes teachers in the junior high school level. A questionnaire was administered through institutional channels. The data were measured on a five-point Likert-type scale (1 = disagree strongly, 5 = agree strongly). After screening, valid responses were obtained. The sampling strategy allows representation of teachers from various schools, thereby facilitating generalisation within the regional framework. The information was checked for missing values, outliers and inconsistencies in responses. The subjects of the study were teachers of the junior high school in Kunming, China. The minimum sample size (N) was calculated within "10-times rule" recommended in PLS-SEM, which suggests minimum 10times the maximum number of paths from a latent construct to another latent construct. For the current model, the number of incoming paths were largest for teacher innovative behaviour (3 paths: distributed leadership , Teacher Self-efficacy, and PLCs) suggesting that at least 30 respondents were needed for this model. A significantly larger sample, however, was taken to enhance the power on statistical and stability of

the model. Furthermore, the statistical power analysis, using a medium effect size (f^2 = 0.15), significance level (α = 0.05), and power of statistics 0.80, indicated that the minimal sample size needed for SEM analysis is more than 200 respondents.

A stratified random sampling technique was employed to ensure adequate representation of junior high school teachers from different schools in Kunming, China. Schools were grouped into predefined strata, and respondents were randomly selected within each stratum. This method enhanced the representativeness of the sample and reduced sampling bias, thereby improving the generalizability of the study findings.

Ethical Considerations: All ethical requirements for research that were met by this study involved the collection and analysis of data. All participants gave informed consent, and personal information was kept confidential and anonymous. Participants were told that their answers would only be used for academic research and that they had the right to withdraw at any time without consequences.

3.5 Survey Instruments

The information was gathered using a structured questionnaire of four major constructs, which were measured by a 5-point Likert scale ranging from:

1 = Disagree Strongly

2 = Disagree

3 = Neutral

4 = Agree

5 = Agree Strongly

3.5.1 Distributed leadership (DL)

Distributed leadership was assessed using modified items from established distributed leadership scales in educational leadership research. The construct consisted of four dimensions: Participative decision-making, Distribution of support, Distribution of supervision, and Leadership team collaboration. The scale contained **15 items**.

Sample items:

- "School leaders involve teachers in important decision-making processes."
- "Leadership responsibilities are shared among staff members."
- The reliability analysis demonstrated strong consistency on internal:
- Cronbach's Alpha = 0.917–0.979
- Composite Reliability = 0.934–0.981
- AVE = 0.669–0.880

3.5.2 Teacher Self-efficacy

Teacher Self-efficacy was measured across three dimensions: Student engagement, Instructional practices, and Management on Classroom. The scale included **12 items** adapted from widely used Teacher Self-efficacy instruments.

Sample items:

- "I can motivate students who show low interest in learning."
- "I am confident in managing classroom behaviour effectively."
- Psychometric properties indicated satisfactory reliability and validity:
- Cronbach's Alpha = 0.886–0.948
- CR = 0.921–0.963
- AVE = 0.745–0.866

3.5.3 Professional Learning Communities (PLCs)

PLCs were measured using dimensions that include shared and supportive leadership, shared values and vision, collective learning, shared personal practice, and supporting conditions. The construct consisted of **20 items**.

Sample items:

- "Teachers regularly collaborate to improve teaching practices."
- "The school encourages collective problem-solving among teachers."
- Cronbach's Alpha = 0.915–0.955
- CR = 0.936–0.965
- AVE = 0.747–0.847

3.5.4 Teacher Innovative Behaviour (TIB)

The innovative behaviour of teachers was evaluated across four dimensions: opportunity exploration, idea production, idea promotion, and idea implementation. The scale comprised 16 elements.

Sample items:

- "I frequently develop new teaching ideas."
- "I actively implement innovative teaching strategies in the classroom."

Reliability and validity results were satisfactory:

- Cronbach's Alpha = 0.888–0.956
- CR = 0.919–0.966
- AVE = 0.695–0.850

3.5.5 Measurement Validity and Reliability

The measurement model was evaluated using Indicator loadings, Cronbach's alpha (CA), Composite reliability (CR), Average variance extracted (AVE), Heterotrait–

Monotrait ratio (HTMT). The factor loadings were all above the recommended value of 0.70, indicating the reliability of the indicators. The reliability of internal consistency was assessed as a CR value and was above 0.70, and the convergent validity was assessed as an AVE value, which was above 0.50. HTMT was used to check the validity of the discriminant of all constructs, which were under the threshold of 0.90, indicating that the constructs were empirically measurable.

3.6 Confirmatory Factor Analysis (CFA)

The validation of the measurement model was conducted via confirmatory factor analysis within the PLS-SEM framework. The results showed significant loadings of all the indicators on their associated structures, varying from 0.81 to 0.89, which were standardized loadings. The higher-order constructs also supported the hierarchical component model (HCM), showing that the higher-order construct was a useful representation of the lower-order dimensions. The results are in line with the construct validity of the measurement model.

3.7 Measurement Model Specification

This represents Construct Operationalization in Figure 1

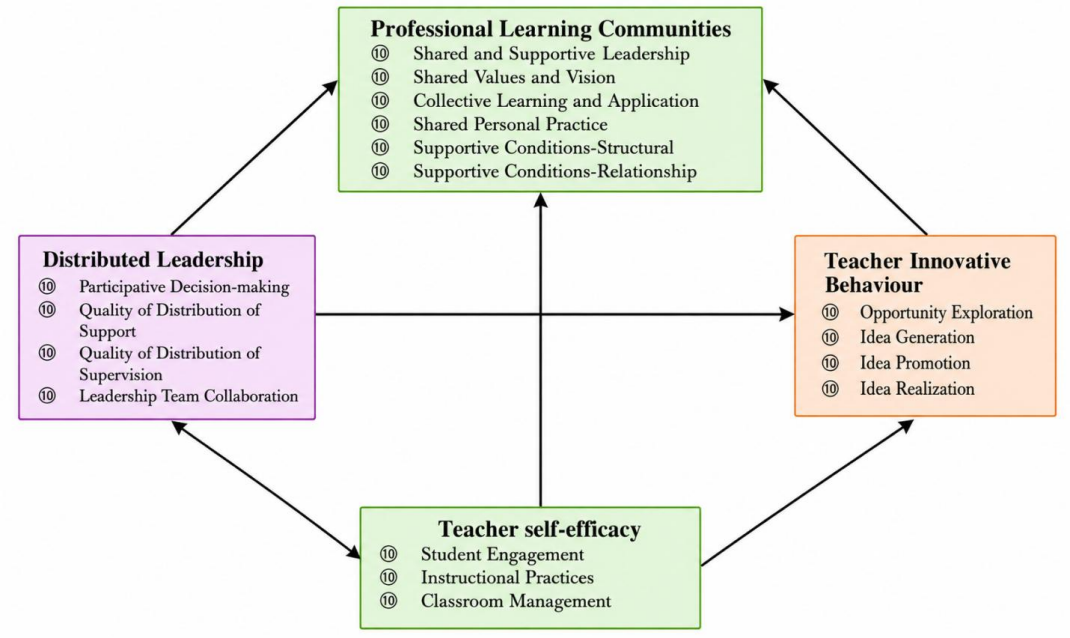

Figure 1: Conceptual Framework for This Study

Hypothesis Specification and Structural Model

The structural model illustrates the causal interconnections among latent factors in the proposed framework. The structural model assesses the direct and indirect relationships between distributed leadership, Teacher Self-efficacy, PLC and

behaviour on teacher innovative, rather than as in the measuring model, between the constructs and the indicators.

Drawing on Social Cognitive Theory, the model proposes that leadership affects teachers' beliefs about their own abilities, which in turn affects their behaviour. At the same time, informed by Organisational Learning Theory, distributed leadership is hypothesised to create collaborative structures (PLCs) that facilitate knowledge transfer and collective innovation. Therefore, the structural model includes both psychological (individual) and collaborative (organisational) mechanisms.

Structural Relationships

The model specifies that distributed leadership (DL) acts as the primary exogenous construct influencing:

1. **Teacher Innovative Behaviour (TIB)** directly

$$TIB = \beta_1 DL + \beta_2 TSE + \beta_3 PLC + \zeta_1 \quad (1)$$

2. **Teacher Self-efficacy (TSE)**

$$TSE = \beta_4 DL + \zeta_2 \quad (2)$$

3. **Professional Learning Communities (PLC)**

$$PLC = \beta_5 DL + \zeta_3 \quad (3)$$

In turn, both TSE and PLC are hypothesized to influence TIB, forming mediating pathways**.**

$\boldsymbol{\beta}$ represents standardized path coefficients

ζ denotes residual terms

Mediation Effects

The indirect effects are calculated as:

$$DL \rightarrow TSE \rightarrow TIB = \beta_4 \times \beta_2 \quad (4)$$

$$DL \rightarrow PLC \rightarrow TIB = \beta_5 \times \beta_3 \quad (5)$$

These equations enable the assessment of the mediating functions of Teacher Self-efficacy and PLCs within the context of the link between distributed leadership and innovative behaviour.

Hypothesis Development

The theoretical model supports the hypotheses:

Direct Effects

H1: Distributed leadership has a significant positive effect on teacher innovative behaviour.

H2: Distributed leadership has a significant positive effect on the Teacher Self-efficacy.

H3: Teacher Self-efficacy significantly influences teacher innovative behaviour.

H4: Distributed leadership is positively related to professional learning communities.

H5: Professional learning communities exert a substantial positive influence on educators.

innovative behaviour.

Mediating Effects

In order to consider indirect pathways of influence, the following mediation hypotheses are proposed:

H6: Teacher Self-efficacy will mediate the relationship between distributed leadership and teacher behaviour on innovation.

H7: Professional learning communities mediate the association between distributed leadership and teacher innovative behaviour.

In the SmartPLS Figure 2 in Appendix , the indicators are connected to the constructs by outer loadings, which represent the significance of each item. This model is used to evaluate measurement properties, such as indicator reliability and consistency. A valid low-order model ensures that the dimensions are well represented before moving to a higher-order analysis.

The higher-order model combines the validated first-order constructs to create higher-order (second-order) constructs, resulting in a hierarchical component model based on the study's theoretical framework. Distributed leadership , Teacher Self-efficacy, communities on professional learning and teacher innovative behaviour are represented as higher-order constructs made up of their dimensions. The SmartPLS Figure 3 in Appendix shows these connections as paths between the higher-order constructs, with path coefficients (β) and R^2 values denoting the amount of variance explained. This figure is to test the proposed relationships (indirect and direct) to understand the impact of distributed leadership on teacher innovative behaviour through psychological and organisational factors.

The Figure 4 in Appendix shows the conceptual model of the study, which includes the links between distributed leadership , Teacher Self-efficacy, PLC and teacher innovative behaviour. Distributed leadership is the independent variable, with Teacher Self-efficacy and PLCs as the mediating variables. The arrows represent predicted relationships, and the figure shows direct and indirect relationships, which

demonstrate the influence of leadership on innovation through Teacher Self-efficacy and PLCs.

Results and Discussion

4.1 Statistical Description

Descriptive statistics (see Table 2) are examined to understand the distribution and central tendencies of the variables. As indicated in Table 2, the values of mean all constructs are above the centre point of the Likert scale, suggesting that participants generally rate distributed leadership , Teacher Self-efficacy, PLC and innovation moderately to highly.

Table 2: Constructs on descriptive statistics

Construct	No. of Items	Mean	Std-Deviation	Interpretation
Distributed leadership (DL)	15	3.85	0.62	High
Teacher Self-efficacy (TSE)	12	3.78	0.58	Moderate–High
Professional Learning Communities (PLC)	20	3.92	0.65	High
Teacher Innovative Behaviour (TIB)	16	3.81	0.60	High

Professional learning communities (PLC) show the highest mean values among the constructs, indicating that collaborative practices, shared vision and collective learning are strongly fostered in the sample schools. The mean values for Teacher Self-efficacy are slightly lower than those for PLC and distributed leadership , suggesting that while teachers are confident in their teaching and leadership abilities, they can further develop their skills in areas such as classroom management and teaching strategies.

4.2 Assessment on measurement model

Table 3 indicates that the reliability and convergent validity of the measurement model were assessed using Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE) metrics.

Table 3: Reliability and Convergent Validity

Construct	Dimension	CA	CR	AVE
Distributed leadership	Participative Decision-Making	0.917	0.934	0.669
Distributed leadership	Distribution of Support	0.975	0.978	0.834

Distributed leadership	Distribution of Supervision	0.932	0.956	0.880
Distributed leadership	Leadership Team Collaboration	0.979	0.981	0.839
PLC	Shared & Supportive Leadership	0.922	0.942	0.765
PLC	Shared Values & Vision	0.946	0.959	0.824
PLC	Collective Learning	0.932	0.948	0.787
PLC	Shared Personal Practice	0.948	0.960	0.829
PLC	Structural Support	0.955	0.965	0.847
PLC	Relational Support	0.915	0.936	0.747
Teacher Innovative Behaviour	Opportunity Exploration	0.888	0.919	0.695
Teacher Innovative Behaviour	Idea Generation	0.953	0.964	0.843
Teacher Innovative Behaviour	Idea Promotion	0.942	0.956	0.813
Teacher Innovative Behaviour	Idea Realization	0.956	0.966	0.850
Teacher Self-efficacy	Student Engagement	0.886	0.921	0.745
Teacher Self-efficacy	Instructional Practices	0.948	0.963	0.866
Teacher Self-efficacy	Classroom Management	0.920	0.943	0.806

As shown in Table 3, all of the constructs and their dimensions have demonstrated the highest degree of reliability with a Cronbach's alpha ranging between 0.886 and 0.979, above the recommended level of 0.70. Likewise, composite reliability ranges from 0.919 to 0.981, confirming the reliability of the constructs. These findings suggest that the items used to measure the constructs are highly consistent. AVE to assess convergent validity, and all values are well above the threshold of 0.50 (0.669 to 0.880). This guarantees that each construct accounts for over 50% of the variance in the measurement items, thus demonstrating satisfactory convergent validity. The highest scores for reliability and validity are related to the constructs distributed leadership and PLC, which reflect the multidimensionality of these constructs.

4.3 Assessment on Structural model

The structural model was assessed in terms of path coefficients, their significance, and the associated t-values (using a bootstrapping resample of 5000). As show in Table 4, all the proposed pathways are significant at $p < 0.001$.

Table 4: Hypothesis Testing and Path Coefficients

Hypothesis	Path Relationship	β (Path Coefficient)	t-value	p-value	Decision
H1	Distributed leadership → Teacher Innovative Behaviour	0.32	5.87	<0.001	Supported
H2	Distributed leadership → Teacher Self-efficacy	0.48	8.12	<0.001	Supported
H3	Teacher Self-efficacy → Teacher Innovative Behaviour	0.29	4.95	<0.001	Supported
H4	Distributed leadership → Professional Learning Communities	0.55	9.21	<0.001	Supported
H5	Professional Learning Communities → Teacher Innovative Behaviour	0.34	6.03	<0.001	Supported

Distributed leadership has a positive impact on teacher innovative behaviour (β = 0.32), suggesting that distributed leadership contributes to teaching innovation. Additionally, distributed leadership has a significant impact on Teacher Self-efficacy (β = 0.48) and professional learning communities (β = 0.55), indicating its important role in promoting teacher confidence and collective organisational practices. Teacher Self-efficacy significantly influences teacher innovative behaviour (β = 0.29), which supports the idea that teachers who have confidence in their ability to make a difference are more likely to be innovative. Likewise, PLC have a significant positive effect on teacher innovative behaviour (β = 0.34), suggesting that collaborative learning and practice are vital to promoting innovation.

4.4 Analysis of Mediation

To test the mediation effects of TSE and PLC link between distributed leadership (DL) and teacher innovative behaviour (TIB), a bootstrapping routine (5000 resamples) was conducted in the SmartPLS software.

Table 5: Indirect Effects and Mediation Results

Hypothesis	Path on indirect	Effect on indirect (β)	t-value	p-value	Decision
H6	DL → TSE → TIB	0.14	3.87	<0.001	Supported
H7	DL → PLC → TIB	0.19	4.65	<0.001	Supported

As shown in Table 5, the two indirect effects are significant. The effect on indirect of distributed leadership on teacher innovative behaviour via Teacher Self-efficacy ($\beta = 0.14$, $p < 0.001$) shows that self-confidence plays an important mediating role. This demonstrates that distributed leadership boosts teachers' self-confidence in teaching, which consequently results in innovative behaviours.

4.5 Model Fit and Predictive Relevance

The predictive power of the structural model was evaluated using Stone-Geisser's Q^2 value derived from the blindfolding technique in SmartPLS. As represented in Table 6, the Q^2 value of all endogenous constructs is greater than zero, suggesting the model is predictively relevant.

Table 6 Predictive Relevance (Q^2) and Effect Size (f^2)

Construct	R^2	Q^2	Interpretation (Q^2)
Teacher Self-efficacy (TSE)	0.23	0.15	Medium Predictive Relevance
Professional Learning Communities (PLC)	0.30	0.18	Medium Predictive Relevance
Teacher Innovative Behaviour (TIB)	0.52	0.31	Strong Predictive Relevance

In particular, teacher innovative behaviour (TIB) has the highest Q^2 value (0.31), which indicates that the model has a strong predictive relevance in explaining innovation-related outcomes. Likewise, PLC and Teacher Self-efficacy (TSE) have moderate predictive relevance, supporting the fact that distributed leadership explains variations in both organisational and individual factors. Finally, to

understand the impact of independent constructs on dependent variables, the effect size (f^2) was analysed.

Table 7 Effect Size (f^2)

Path Relationship	f^2	Effect Size
DL → TSE	0.29	Medium
DL → PLC	0.42	Large
DL → TIB	0.18	Medium
TSE → TIB	0.12	Small–Medium
PLC → TIB	0.21	Medium

In Table 7, it is shown that distributed leadership has a large effect on professional learning communities ($f^2 = 0.42$) and a moderate effect on Teacher Self-efficacy ($f^2 = 0.29$), underscoring its significance for creating a supportive collaborative environment and individual capacities. Additionally, the influence of Teacher Self-efficacy and professional learning communities on teacher innovative behaviour is both moderate.

The Figure 5 in Appendix shows the empirical results of SmartPLS. The path coefficients (β) shown on the arrows show the magnitude and significance of the relationship between constructs. The numbers in the circles (R^2) represent the explained variance of endogenous variables, reflecting the model's explanatory power. Loadings on the indicators ensure measurement validity.

Discussion

The impact of distributed leadership on teacher innovative behaviour through the Teacher Self-efficacy and PLCs was investigated. The outcome offers robust empirical evidence for the model and adds to our knowledge of the ways in which leadership practices influence innovation in education via psychological and organisational mechanisms.

5.1 Distributed leadership on Teacher Innovative Behaviour

Our findings support the positive impact of distributed leadership on teacher innovative behaviour. These results are consistent with existing research that shows that distributed leadership promotes teacher innovation through creativity, autonomy, and experimentation. For example, Lin Q (2022) showed that distributed leadership promotes teacher innovativeness via greater collaboration, and Gong J (2025) found similar effects in Chinese schools, stressing the importance of leadership distribution in teaching innovation. This novel demonstrates that leadership distribution not only has a direct impact on innovation but also works

through several mediating pathways. This supports the call for school leadership to shift from traditional, top-down approaches to more participatory and empowering approaches.

5.2 Role of Teacher Self-efficacy

Our results show that the Teacher Self-efficacy plays a crucial mediating role between distributed leadership and teacher innovation. This finding aligns with the theoretical predictions of Social Cognitive Theory, which stresses the influence of personal beliefs. In line with Abdullah Z et al. (2025), the Teacher Self-efficacy plays a key psychological role in translating collaborative practices into professional outcomes. Similarly, Wang G et al. (2025) report that self-confidence mediates the relationship between collaboration among teachers, leadership, well-being, and performance. Our research supports and expands these findings by showing that self-confidence also plays a crucial role in facilitating innovation, especially in Chinese schools. It also supports the systematic review by Gordon D et al. (2023), which identifies self-confidence as a key component of teachers' intentions to implement innovations and undertake reform activities.

5.3 Role of Professional Learning Communities

The research also identifies that PLCs play a critical role in mediating the impact of distributed leadership on teacher innovative behaviours. This conclusion aligns with Organisational Learning Theory, which suggests that collaborative settings promote knowledge sharing and problem solving. This is supported by empirical evidence, such as Pan H-L W (2023), which showed that PLCs support teaching practice through collaborative learning and development opportunities. Likewise, Yang X and Chang Y-C (2024) found that PLCs mediate the effects of distributed leadership on teacher development. Moreover, Xiu Q et al. (2022) reported that PLCs mediate the relationship between distributed leadership and organisational outcomes, such as change commitment. This study builds on this research base by showing that PLCs are also vital in facilitating innovative teaching practices, and as such are an important organisational driver of innovation.

5.4 Contribution to Theory and Practice

Theoretically, this study adds to the emerging research on distributed leadership by considering both individual-level mediators. This fills a gap in the literature, which tends to consider these aspects separately. From a practical perspective, the research findings indicate that school leaders should promote shared decision-making and leadership distribution , strengthen professional learning communities , and enhance the Teacher Self-efficacy through support and empowerment .

5.5 Contextual Contribution

Crucially, this research offers empirical findings from Kunming, China, thus adding to the scarce but emerging literature on distributed leadership in Asia. The findings are

in line with those of Liu J et al. (2023) and Wang T et al. (2022), which demonstrate the importance of distributed leadership for improving teacher outcomes in Chinese schools. Using both psychological and organisational mediators, this study provides a contextualised and holistic framework for future studies and policy directions in similar contexts.

The results of this study are broadly comparable to those of international research carried out in other educational settings such as those in Asia and Europe (as presented in the Table 8 in Appendix). Distributed leadership was observed to have a positive impact on teacher-related outcomes in this study, as in the studies carried out in China, Taiwan, Türkiye, Malaysia and Indonesia, and this impact was found to be through the mechanisms of collaboration and psychological. The current study, however, adds to the value by incorporating both Teacher Self-efficacy and PLCs in a common dual mediation model. Findings are consistent across the countries studied, indicating that the suggested relationships have a high degree of cross-cultural applicability, although it is possible that cultural variations in leadership behaviours and culture within the school may impact the size of these effects.

Conclusion

This research represents the effects of distributed leadership on teachers' innovative behaviour, mediated by the Teacher Self-efficacy and PLC in junior high schools. The results offer robust empirical evidence for the model and show that distributed leadership serves a significant function.

in boosting teacher innovative behaviour, directly and indirectly. In particular, the result verifies that distributed leadership is related to teacher innovation in two ways: a psychological effect, with leadership enhancing. This research offers a holistic understanding of the translation of leadership into teacher innovation by bridging Social Cognitive Theory and Organisational Learning Theory. This study adds to the body of knowledge by emphasising the need to look at the individual and organisational levels to explain teacher innovation.

6.2 Implications on Practical

1. Foster Distributed leadership : School leaders should avoid hierarchical leadership practices and embrace distributed leadership practices that promote collective decision-making and leadership. This may improve teachers' sense of ownership and innovation.

2. Strengthen Teacher Self-efficacy: School leaders should provide opportunities for teachers to develop a sense of confidence in their professional capacities, such as Continuous professional development programs, Mentorship and coaching systems, Feedback and recognition systems. Improving self-confidence can lead to increased teachers' motivation to engage in innovative teaching.

3. Build Professional Learning Communities (PLCs): Schools must focus on building PLCs by promoting lesson planning and teaching practice. PLCs provide a framework for experimentation and innovation.

4. Embed Leadership, Collaboration, and Innovation: Governments should create educational reforms that link leadership training with collaborative learning models and ensure innovation at the individual and organisational level.

6.3 Limitations

The study has several limitations, including its cross-sectional design, reliance on self-reported data, and focus on a specific geographic region. These limitations were addressed through the use of a theory-driven research framework, stratified random sampling, procedural and statistical controls for common method bias, and robust PLS-SEM analysis. Furthermore, reliability, validity, and predictive relevance assessments confirmed the robustness of the findings despite these constraints.

- Cross-Sectional Design: The research utilises cross-sectional data, making it difficult to draw causal links. Longitudinal research should be conducted to explore the development of leadership and innovation.
- Self-Reported Data: The study employed self-reported questionnaires to measure all variables, which may have caused common method bias and social desirability bias.
- Limited Variables: While the study explores important mediating variables, other potential factors such as teacher autonomy, school culture, and leadership (e.g., transformational leadership) were not considered.

6.4 Future Research Directions

These limitations suggest the following areas for future research:

- Multilevel Analysis: In a school context, teachers work in schools, so future research could use multilevel modelling (MSEM) to explore the effects of school leadership on individual teachers.
- Cross-Cultural Comparisons: Cross-cultural comparisons at the national or regional level may enable us to understand cultural variations in the relationship between leadership and innovation.
- Combining with Advanced Statistical Techniques: Future studies could integrate PLS-SEM with other methods, such as ANN , Fuzzy-set Qualitative Comparative Analysis (fsQCA), to model complex patterns and nonlinear relationships.

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