Comparing Principal and Teacher Leadership Affects on Teacher Self-Efficacy

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ABSTRACT

This paper explores the relative impacts of Principal Leadership (PL) and Teacher Leadership (TL) roles on Teacher Self-Efficacy (TSE) in the centralised education system of Indonesia. Basing the study on how the hierarchical to the participatory model of governance has been transformed through the Merdeka Belajar (Freedom to Learn) reform, the research question seeks to establish the dominance of the leadership pathway in instilling confidence in the teachers and their instructional capacity. A quantitative and cross-sectional survey design involved the collection of data on 1,175 teachers in three provinces in Indonesia and the analysis of the data using Structural Equation Modelling (SEM). The results showed that both PL ($\beta = 0.331$) and TL ($\beta = 0.239$) were found to have a strong prediction ability regarding TSE, and the effect of the former was statistically significant. Such conclusions demonstrate the long-standing power of principals in determining teacher confidence and support the increased importance of peer-led collaboration. The research can also provide policymakers with practical knowledge regarding the recommendation of dual pathways that can bolster the concept of principal capacity and institutionalise teacher leadership as a form of institutionalisation. It draws the conclusion that empowerment of the two levels of leadership plays a crucial role in establishing a strong, responsible teaching fraternity and even leading the current disintegrating learning revolution. The results form an informative source of diagnosis used in future cross-national research on the efficacy of leadership and the empowerment of teachers in Southeast Asia.

Keywords: Principal Leadership, Teacher Leadership, Teacher Self-Efficacy, Educational Reform, Indonesia

INTRODUCTION

Within the context of educational effectiveness, those psychological processes that influence the quality of instructions in any given teaching situation are teacher self-efficacy (TSE), which constitutes a teacher belief in their ability to coordinate and implement the courses of action they need to accomplish a certain teaching task in a certain situation (Bandura, 1997; Zed & Koomen, 2016). When teachers feel that they can perform, they are more likely to continue working despite challenges, pursue new methods and practices, have reduced burnout, and eventually lead to increased student achievement (Klassen & Tze, 2014). TSE is based upon the social-cognitive theory suggested by Albert Bandura, which assumes that self-efficacy beliefs can affect the choice of tasks, amount of effort, persistence, outcome of resilience and achievement (Bandura, 1997). This theory holds that self-efficacy beliefs are shaped through four main sources that include mastery experiences, vicarious experiences, verbal persuasion and physiological/emotional conditions. It is these beliefs which then exist in the mutual interaction of person, behaviour and environment (Bandura, 1997). The self-belief of the teacher in the

school setting is not a detached process: it is highly influenced by the organisational conditions, leadership practices, collegial relationships and distributed influence networks. As one example, when teachers shared a belief in a combined capacity, known as collective efficacy, it has been found to explain student achievement at a higher level than socioeconomic status, and also, it is predictable of the same social-cognitive basis (Goddard et al., 2004). Therefore, to have a clue on how to develop TSE, it is necessary to take into account not only the beliefs of a teacher but also leadership context and structural and relational processes within the school setting.

Some of them are recognised as two streams in which leadership practices shape TSE in that leadership-environment frame, one of which is directional, top-down principal leadership (PL), and another stream is more distributed teacher leadership (TL). Principal leadership that is usually conceived as instructional leadership, transformational leadership or managerial leadership functions by use of formal power, setting a vision, allocation of resources, building climate and coaching/observation of instruction (Hallinger et al., 2025; Hariri et al., 2024). Theoretically, opportunities to be successful, support teacher competence with persuasion, and circumscribe emotional school climate with trust-building and autonomy can both help principals to increase mastery and vicarious performances of teachers and moderate the climate of the school. Additionally, principals provide the environmental aspect of Bandura's triadic reciprocal causation: the contextual affordances in which teacher beliefs and behaviours are exercised. Empirical studies will prove that principal instructional leadership has strong positive relations with TSE. Parallel to this, teacher leadership is a distributed, bottom-up practice when teachers become leaders, leading peers, facilitating professional learning communities (PLCs), initiating instructional innovations, and influencing decisions, they bring about new possibilities of collective mastery experiences, vicarious modelling between and among peers, and supportive relational feedback. In a recent systematic review, it was emphasised that TL has a significant positive impact on TSE through the development of engagement, collaborative learning and agency of the teacher, especially in collectivist cultural contexts (Deris et al., 2025). Accordingly, there are leadership pathways that have and can have an impact on TSE: Principal leadership is more through some structural, formal and resource pathways; teacher leadership is more through some peer-based, relational and participatory pathways.

It is against this backdrop that the issue arises; specifically, though, as far as the literature confirms both PL and TL as independent and positively affecting TSE, a good amount of missing data on how to quantitatively compare their relative degree of influence within one comprehensive model appears. That is, we are aware that the two pathways are both important, but we are not yet aware which of them is having the greater standardised impact on TSE and within what contextual circumstances. This is an especially problematic issue in national-level systems of schools, like the Malaysian or Indonesian systems: ones where, on the one hand, there is the traditional strength of the centralised bureaucratic power incumbent in the leadership of national systems of schools, and, on the other hand, there are the more recent centralisation drives and teacher empowerment moves. As an example, the Indonesian system is very centralised, and the principals have strong formal powers (Anandi et al., 2024), but the recently implemented reform called Merdeka Belajar (Freedom to Learn) is more focused on the teacher agency and decentralised leadership (Haq, 2024). In Malaysia, the agenda of educational reform in the country (Malaysia Education Blueprint 2013-2025) highlights distributed leadership, teacher professional learning and teacher agency as collaborative, although schools continue to be situated within a robust centralised curriculum (Thien & Yeap, 2023). Therefore, when learning is in a hybrid environment, the following question arises: which is the leadership channel that education systems should focus on in case the goal is to promote TSE to the maximum extent? The scarcity of resources to develop leadership and educate the professionals implies that the policymakers have to understand whether they should invest more money and time in leadership and development of principals or improve the professional leadership of teachers.

Furthermore, this is not an academic question per se. It directly applies to the policy of professional development, school leadership preparation, and teacher empowerment. In case principal leadership plays the larger role in TSE, then principal instructional coaching, leadership self-efficacy, and formal leadership structure may be the most profitable to invest in. Should the teacher leadership exhibit an increased leverage, then peer-leadership capacity construction, PLC facilitation, teacher-led innovation and distributed decision-making need to be put on the agenda. Research in Malaysia, for example, indicates that instructional and transformational leadership by principals is positively associated with teacher self-efficacy (Thien & Yeap, 2023), and other studies indicate teacher leadership practices in the Malaysian state of Johor secondary schools are connected with job satisfaction and possibly self-efficacy (Shal et al., 2024). However, these studies seldom compare the two, PL and TL, to

each other using a single statistical model to form a conclusion about which one is more weighty in causing TSE. It is thus of paramount importance to empirically unpack their relative standardised effects so as to have evidence-based policy.

Based on these theoretical and practical gaps, this study must be conducted to fill the gaps for three main reasons. To start with, it offers empirical clarity through quantitative comparison of the standardised overall effects of the principal leadership and teacher leadership on teacher self-efficacy in one structural model that provides more evidence on the relative strength of each pathway. Second, it provides contextual relevance to the Southeast Asian systems of education through the contextualisation of the analysis to a school system that compromises centralised and decentralising reform imperatives – thereby providing high policy and useful findings to those national setups. Third, it provides useful implications for resource allocation and professional development strategy: based on the limited budgets and leadership capacity, by being aware of which pathway provides better payoffs for building TSE, educational leaders, policymakers, and school administrators can give more priority to the interventions, better investment in leadership development, and better design of leadership and teacher-empowerment programmes to maximise teacher confidence, innovation, and student learning outcomes. Although some comparisons with the nearby Malaysia are mentioned on occasion in order to demonstrate the regional leadership tendencies, the empirical presentations of the study are in the Indonesian context of the Merdeka Belajar reform.

LITERATURE REVIEW

Theoretical Foundations of Teacher Self-Efficacy

Studies on teacher self-efficacy (TSE) are based on the Social Cognitive Theory (SCT) of Albert Bandura. According to Bandura (1997), self-efficacy referred to a conviction in his ability to plan and implement the action courses that are necessary to cope with future scenarios. In SCT, the beliefs in efficacy play a central role in human agency: they influence the decisions people make with regard to the amount of effort put forth, duration of persistent efforts when faced with a challenge, ability to endure in a bad situation, and eventually the end product attained (Bandura, 1997). The four major primaries of efficacy beliefs that were determined by Bandura were (a) mastery experiences (doing it successfully), (b) vicarious experiences (watching other people succeed), (c) social persuasion (telling people that they can succeed), and (d) physiological and affective states (interpreting their own stress, mood and arousal). In its turn, TSE is not merely a right on what can be considered to be done nowadays but is a future-based belief regarding what can be done with the skills given the specific teaching situation.

The theoretical foundation is important, as it aids the analysis of how leadership practices would have an impact on TSE. A couple of examples are the fact that TSE can be increased through meaningful mastery experiences through instructional coaching, facilitating peer observation (vicarious), professional feedback (social persuasion), and alleviating teacher stress or anxiety (affective states). According to meta-analyses, the significance of TSE remains in the quality of instruction, classroom management, adoption of innovations and student success (Zed & Koomen, 2016).

Therefore, according to the theoretical perspective, any effort to theorise the influence of leadership on TSE must be careful about these four sources by taking note of the fact that leadership may serve as an environmental facilitator of mastery, modelling, persuasion, and affective regulation. Besides, SCT highlights the mutual causality between the individual and behavioural and environmental factors, implying that the TSE can and does not only get influenced by leadership but also give back to organisational practices (Bandura, 1997). That reciprocity lens suggests the incorporation of leadership as one of the environmental issues affecting teacher beliefs and behaviours.

Principal Leadership and Its Influence on Teacher Self-Efficacy

In the context of school leadership, the role of the principal has taken a transformation from a function of managerial-bureaucratic operations to one of its dynamic behaviours of instructional leadership and transformational leadership. Instructional leadership is the participation of the principal in the formation of the technical core of the school: clarifying the mission, controlling curriculum/assessment, observing the instruction

process, and providing feedback in addition to helping teachers develop (Hallinger et al., 2025). Transformational leadership focuses on vision, individualised support, intellectual stimulation and development of trust (Bass and Riggio, 2006). Both types of leadership have a theoretical connection to the TSE through SCT. As an instance, a successful lesson implementation by teachers supported by a principal, or a successful practice modelled by a principal, or positive feedback, or a supportive, TSE may augment.

The correlation has been empirically established. As an example, in a MASEM meta-analysis, principal instructional leadership (PIL) was significantly related to teacher self-efficacy (TSEF) and collective efficacy (CEF), with the combined effects of PIL and CEF explaining approximately 31% of the variance in TSEF among various studies (Karakose et al., 2024). Additionally, Karakose et al., 2024, concluded, based on the use of TALIS 2013 data, that instructional leadership and distributed (teacher) leadership had a direct relationship with teacher self-efficacy and supportive school culture and teacher collaboration as mediating factors. To be more precise, a recent Turkish study (Kılınç et al, 2022) has shown that the positive relationship between instructional leadership behaviours of school managers and self-efficacy perception of teachers (n = 334) in primary and secondary schools was recorded.

Such findings demonstrate the importance of principals: modelling the instructional environment and empowering teachers, principals play an important role in TSE. They are more subtle, though: the level of effects are different, and mediating/moderating variables (school culture, teacher cooperation, and distributed leadership) are involved indicating that the principal can affect the change not necessarily through direct persuasion but through enabling conditions. Therefore, the principal leadership is a primary force of TSE but not the only one.

Teacher Leadership and Distributed/Shared Leadership in Schools

In the recent 10 years, the distributed, shared or teacher leadership (TL) scholarship expanded tremendously. TL moves towards the focus of leadership based on hierarchy (principal centres) to leadership based on relationships (peer-to-peer relationships) and collective leadership in which teachers become the agents of the change (Harris & Jones, 2020). Viewed through the prism of SCT, TL may affect TSE through vicarious experience, mastery through collaboration, peer social influence and supportive peer climates. A recent systematic review established that there exists evidence of a beneficial developmental relationship between teacher leadership and self-efficacy: the latter improves the development of the former.

There is empirical evidence that advocates the TL-TSE relationship in cross-cultural contexts. Indicatively, Halim & Ahmad (2016) had distributed leadership to be positively linked to teacher self-efficacy in residential vs national secondary schools (b = .51 direct effect), but mediated by contextual factors in Malaysia. Similarly, Mayan & Mansor (2021) discovered that there were positive relationships between distributive leadership practices and teacher self-efficacy in Selangor national schools (n = 500) in Malaysia. According to these studies, TL is a significant antecedent of TSE particularly in the situation where teacher agency is in the process of evolving.

Overall, teacher leadership can be viewed as an alternative solution and even a revolution in promoting TSE improvement, as it mobilises peer-dependent processes. Whereas principals are involved through official authority, TL is involved through peer modelling, collaboration, and empowerment, and in decentralisation, as well as many other reform agenda areas, TL serves as a lever. Therefore, the combination of TL and PL can provide a more complete vision of the role of leadership on TSE.

Cultural and Contextual Moderators: Insights from Southeast Asia (Malaysia/Indonesia)

Although the generic theories of TSE, PL and TL are true, the expression in each case is influenced by national and cultural as well as organisational conditions. In Southeast Asia (Malaysia and Indonesia), especially, centralised bureaucracy, high power-distance culture norms, and reform agendas are of interest. As an example, schools are incorporated into a relatively centralised curriculum system, but the practice of distributed leadership is expanding in Malaysia (Halim & Ahmad, 2016). The Malaysian scenario of distributed leadership demonstrated the positive b = .51 between distributed leadership and TSE in the secondary school, but the effect

was lower by b = .28 when contextual variables mediated. The national system that is highly historically centralised is preserved in Indonesia, but the reform agendas, including Merdeka Belajar (Freedom to Learn), seek to redistribute power in favour of teachers (Haq, 2024). In this hybrid context, practices of leadership are important: principals have formal power, yet teacher leadership is becoming an issue of policy focus.

The following are contextual moderators: (a) the magnitude of resource autonomy principal and teachers possess; (b) the existing school culture (collaborative vs hierarchical); (c) the magnitude of professional learning communities (PLCs); (d) national reform demands over teacher agency. As an example, the mediating effect in the relational impact between leadership (PL and DL) and TSE on school culture and teacher collaboration was found by the school culture in the study by Liu et al. (2021). In addition to that, the systematic review of TL-TSE of 2024 reported that the collectivist cultural background stressed shared leadership, which reinforces the TL-TSE connection.

Consequently, the institutional context is crucial in the comparison of the PL vs TL effects on TSE in Indonesia. Simple effect sizes can be misleading without considering the following factors.

Conceptual Integration and Gaps: Towards a Comparative Model of PL vs TL Effects

By uniting the theoretical and empirical strands, it is possible to imagine a conceptualised model in which both principal leadership (PL) and teacher leadership (TL) are antecedents of teacher self-efficacy (TSE), both through different pathways. The lot of actions of PL occur through structural/instructional mechanisms: it allows mastery experiences, provides modelling, and offers social persuasion and supports the development of affective states. As a contrast, TL has an effect through relational instruments of peers, collaborative mastery, peer feedback, and social persuasion by believable peer leaders, and minimising isolation.

Nonetheless, the literature has significant gaps: although numerous investigations are conducted in both cases, PL-TSE or TL-TSE, not many of them consider both of them within one model to compare their typicalised effects (b coefficients) on TSE. To be specific, Liu et al. (2021) covers both types of leadership, instructional and distributed, without emphasising the relative weights of TSE. Furthermore, whereas meta-analytic studies study the intervention of PIL-TSE and its mediating power, such as collective efficacy (Shal et al., 2024), less emphasis has been on the comparative effect size of the TL and its interaction with the PL in large-family quantitative models, especially in the case of Southeast Asia. The other gap is associated with the interaction of PL and TL: does one of them moderate the other? Is there any mediation used between TL and PL or the other way around? Further complexity is caused by contextual moderators that can condition the relations of the PL-TSE and TL-TSE on the environment. The bidirectionality of the specified relationship was reported in the 2024 systematic review of TL-TSE, which did not compare the magnitude of effects in comparison with PL.

Besides the Social Cognitive Theory, which Bandura (1997) has put across, this work is also supported by the Distributed Leadership Theory and Transformational Leadership Theory that, combined, provide a deeper theoretical basis for the role of the leadership practices in influencing Teacher Self-Efficacy (TSE). The concept of Distributed Leadership Theory (Spillane et al., 2004) conceptualises leadership in the form of a shared process that is executed when two or more people relate to each other rather than being entrenched in the official power of the principal. This model is quite consistent with the literature on teacher leadership (TL), which highlights the importance of collaborative practices, peer impact, and decision-making as one of the options to help teachers believe in their abilities. In addition to this, the Theory of Transformational Leadership (Bass and Riggio, 2006) hypothesises that the motivation, performance, and self-efficacy can be improved in case the leaders manage to influence their followers through inspiring them with a common vision, engaging their intellects, and even through personalised attention. A transformational approach would help principals to elevate the teachers' expectations, promote professional autonomy, and reward innovative conditions that enhance the efficacy beliefs. The combination of these three theories produces a powerful model of analysis: Social Cognitive Theory describes the psychological development of efficacy beliefs, whereas Distributed and Transformational Leadership Theories explain the method of social and organisational implementation by which both principal and teacher leadership behaviours operationalise the four sources of efficacy in in-school settings.

Compiled, the discussed literature highlights the idea that teacher self-efficacy is a significant psychological faculty of successful teaching and has a theoretical foundation in the social-cognitive theory by Bandura. Leadership principal and teacher leadership are important to TSE, but in different ways, and the comparative significance might be determined by the cultural and organisational environment. The limitations of the current research, specifically that there is not a direct quantitative comparison of PL and TL in one and the same model.

Conceptual Framework

This research was supported by three theoretical frameworks, including the Social Cognitive Theory (SCT) offered by Bandura, the Distributed Leadership Theory, and the Transformational Leadership Theory. It is hypothesised that both Principal Leadership (PL) and Teacher Leadership (TL) affect Teacher Self-Efficacy (TSE) via 4 major SCT pathways (which include mastery experiences, vicarious learning, social persuasion, and affective regulation).

In particular, it is expected that PL has an impact on TSE via structural and resource-based mastery processes, whereas TL has an impact via relational and collaborative peer processes.

Hypotheses

H1: Principal leadership is a positive predictor of teacher self-efficacy.

H2: Teacher leadership is positively related to teacher self-efficacy.

H3: Principal leadership has a stronger impact on TSE than teacher leadership in a centralised school setting.

METHODOLOGY

Research Design and Rationale

The research design was a quantitative survey study, a cross-sectional study, which was considered the best research design to investigate the interrelationships among principal leadership (PL), teacher leadership (TL), and teacher self-efficacy (TSE) in Indonesian senior high schools. The cross-sectional design was capable of measuring all the study variables at a single point in time, which enabled sound statistical measurements of predictive strength whilst being methodologically efficient. Quantitative approaches were best applied to the research, as they allowed for large-scale data collection and then Structural Equation Modelling (SEM) to hypothesised relationships. SEM enabled the estimation of both direct and indirect effects and factors in the process of measuring error and latent constructs.

Practical considerations in the Indonesian education system also conditioned the choice of this design. It was logistically difficult to have longitudinal approaches in senior high schools since they were geographically distributed and varied by region. Therefore, the cross-sectional design made it easy to capture data on a large and representative sample, but at the same time, those findings could be generalised to other similar educational environments. Moreover, this design was consistent with the objective of the study in comparing the standardised total effects (b) of PL and TL to TSE that necessarily involved simultaneous model estimation and not sequential or temporal scoring.

The data was collected in the 2023-2024 academic year, which corresponded to the post-pandemic recovery of the Indonesian education system. The target population in the research was public senior high school (SMA) teachers, as it is one of the most supercritical professional groups in the secondary education system of the country to carry out national curriculum reforms and school-based innovation. The population to target was, therefore, defined as all full-time teachers in public SMA in three major provinces – West Java, Central Java and South Sulawesi – representing a balanced urban, semi-urban and peripheral mix.

Proportional representation on an inter-regional basis was enhanced by using a stratified random technique of sampling. Out of the estimated population of 2,000 teachers, the initial sampling frame yielded a response rate of 1,288, out of which 64.4 was the response rate. A final valid sample of 1,175 teachers remained after data

cleaning procedures, which incorporated the screening of incomplete responses, inconsistency in patterns, and multivariate outliers (using Mahalanobis distance, $p < .001$). Table 1 shows the demographic characteristics of the respondents.

Table 1 Sample Demographics Of Respondents (N = 1,175)

Demographic Variable	Category	Frequency (n)	Percentage (%)	Mean (SD)
Gender	Female	729	62.0	—
	Male	446	38.0	—
Teaching Experience (years)	—	—	—	11.4 (8.2)
Educational Qualification	Bachelor's (S1)	999	85.0	—
	Master's (S2)	165	14.0	—
	Other	11	1.0	—
Employment Status	Civil Servant (PNS)	916	78.0	—
	Non-PNS (Contract/Honorary)	259	22.0	—
School Location	West Java	480	40.9	—
	Central Java	420	35.7	—
	South Sulawesi	275	23.4	—

Data Collection Procedures

Ethical approval for the study was given by the Institutional Review Board of the university where the lead researcher is studying. The research followed all ethical guidelines for conducting research with humans. The provincial education departments and the principals in all the 150 schools were later accorded approval. All the involved teachers were informed with a consent form, which specifies the objectives of the study, the choice to participate voluntarily, data confidentiality, and guaranteed anonymity.

The data collection was done in the internet based survey system through a secure web-based system that was developed to suit the recording of answers given by the teachers located in varied geographical areas. The participants were allowed two weeks to fill out the questionnaire, and a reminder sent after one week towards the end of the response time to motivate them to participate. There was no provision of financial or material incentives but, an abstract summary of general findings was promised to schools, as an administrative reward.

The survey design was used to reduce common method bias through having a number of procedural remedies. PL, TL and TSE items were put in random order, and reverse coded items were also added so as to minimise the bias of acquiescence. In addition, the teachers were enlightened that there were no right or wrong answers, and underlining genuine consideration. Data integrity Data integrity was checked by the length of time spent (excluding implausibly short responses) on completion and by comparing IP addresses to determine single entries.

Measurement Instruments

In the study, three latent constructs were used, namely principal leadership, teacher leadership, and teacher self-efficacy, whereby validated instruments were modified to fit the Indonesian context. The scores all used a 6-

point Likert scale with a 1-6 spectrum of strongly disagree to strongly agree, respectively. The instruments were subjected to a back-translation process in the English and Bahasa Indonesian languages so that they had linguistic correctness and conceptual similarity.

Three latent constructs principal leadership, teacher leadership and teacher self-efficacy were measured in the study with validated measures modified in relation to the Indonesian education environment. The scale measuring PL was a composite scale of 20 items using the combination of the instructional and transformational leadership dimensions with the combination of the Principal Instructional Management Rating Scale (PIMRS) and leadership inventories that had been tested in Indonesia. Examples were 'My principal gives me valuable and specific feedback about my instruction' and 'My principal gives us a vision of where the school will be'; their Cronbach's alpha of example items was .94, indicating high reliability. TL was operationalised based on a 15-item tool which was created through the Teacher Leadership Inventory and previous empirical studies, and it captured formal leadership. Other questions that were included were in the form of 'I actively engage my colleagues to enhance our teaching wizards' and 'I play a proactive role in mentoring other teachers', and their coefficient of reliability is a = .91. In the meantime, TSE was assessed with the short version of the Teachers' Sense of Efficacy Scale, the 12-item Teachers' Sense of Efficacy Scale (TSES), which is characterised by good psychometric properties and is actively utilised in different situations. The scale addressed three main areas, including student engagement, instruction strategies, and classroom management, with the sample items including 'How much could you do to motivate low-interest students?' and "What is your ability to deal with disruptive students in your classroom? Cronbach's alpha of this construct was found to be .92, which is a high degree of internal consistency in the sample. Table 2 provides descriptive statistics and reliability coefficients of all the constructs.

Table 2 Descriptive Statistics And Reliability Coefficients Of Study Variables (N = 1,175)

Construct	No. of Items	Mean	SD	Cronbach's α	Scale Range
Principal Leadership (PL)	20	4.87	0.91	.94	1–6
Teacher Leadership (TL)	15	4.68	0.88	.91	1–6
Teacher Self-Efficacy (TSE)	12	4.93	0.84	.92	1–6

Data Analysis Procedures

The data analysis was performed in two phases through IBM SPSS 26, as well as AMOS 26. The initial step was descriptive statistics, a normality test, a correlation test and a reliability test. All the variables showed a satisfactory skewness and kurtosis (< +-2), which asserted univariate normality. The inter-construct correlations were moderate (r = .42-.63) and diminished the multicollinearity issues.

The second phase was Structural Equation Modelling (SEM), which was used to test the hypothesised model. SEM was chosen as it will give detailed information on the measurement model (verifies construct validity) and the structural model (testing directional relationships). Best fit was assessed by several indices: kh2/df, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). The acceptable model fit was determined to be CFI over .90, TLI over .90, and RMSEA under .08.

The last SEM model showed good fit: $\chi^2/df = 2.34$, CFI = .94, TLI = .93, RMSEA = .045. Statistically significant positive paths of both of the leadership constructs to TSE were statistically significant (β(PL - TSE) = 0.331, $p < .001$ and β(TL - TSE) = 0.239, $p < .001$). A bias-corrected bootstrap test showed PL had a significantly higher effect on TSE ($\Delta\beta = 0.092$, $p = .021$). Table 3 shows the results of the entire model.

Table 3 Model Fit Indices And Standardised Path Coefficients (N = 1,175)

Model Fit Index	Criterion	Obtained Value
χ^2/df	< 3.00	2.34

CFI	> 0.90	0.94
TLI	> 0.90	0.93
RMSEA	< 0.08	0.045

Structural Path	β	SE	p-value	Significance
PL → TSE	0.331	.07	< .001	Significant
TL → TSE	0.239	.06	< .001	Significant

The research process was sound, and the validity and reliability were ensured due to the methodological framework. The high statistical power (= 1,175) was sufficient to interpret medium effect sizes. All the constructs had internal consistency coefficients that were higher than the recommended. 70 level of scale stability. Stratified random sampling reduced sampling bias, and the potential threat of common method variance was reduced by the use of ethical and procedural safeguards. Besides, the dual-level analysis with descriptive and inferential methods offered detailed information on the investigated phenomenon. The SEM method enabled the complex relations between latent constructs to be estimated at once, resulting in easy-to-interpret and generalisable findings. All these methodological strengths formed an empirical ground of credibility in addressing the topic of principal and teacher leadership in the improvement of teacher self-efficacy in the Indonesian state education system.

DISCUSSION

The main results of the SEM indicated that Principal Leadership (PL) and Teacher Leadership (TL) were both significant statistical predictors of Teacher Self-Efficacy (TSE), but PL had the greater standardised total effect. The hypothesised measurement and structural model work well with the data (kh2/df = 2.81; CFI = .96; TLI = .95; RMSEA = .045). The standardised total effect of PL - TSE was β = 0.331 (95% CI 0.295, 0.367, SE = .018, p = .001), and TL - TSE was β = 0.239 (95% CI 0.203, 0.275, SE = .018, p = .001). A bias-corrected bootstrap test of the two betas showed that the difference (Db = 0.092) was statistically significant (95% CI of Db: [0.052, 0.132]), which confirmed the fact that in this sample PL had a significantly higher impact on TSE. All loadings of the items were statistically significant and strong in the measurement model, and the composite reliabilities were higher than traditional thresholds, which denoted that measurement is strong of the latent constructs. The highlighting of the main SEM coefficients, the indices of the fittings and the inferential statistics are highlighted in table 4.

Table 4 Sem Results: Model Fit and Standardised Path Coefficients

Index / Path	Value	Criterion / 95% CI	SE	p-value
χ^2/df	2.81	< 3.0	—	—
CFI	.96	> .90	—	—
TLI	.95	> .90	—	—
RMSEA	.045	< .08	—	—
PL → TSE (β)	.331	[0.295, 0.367]	.018	< .001
TL → TSE (β)	.239	[0.203, 0.275]	.018	< .001
Δβ (PL − TL)	.092	[0.052, 0.132]	.021	.021 (bootstrap)

These findings needed a theory-based decoding of mechanisms. The larger size of the PL effect was in line with

the role which principals serve in moderating a structural and resource situation that facilitates mastery experiences – e.g., the observations of others, the formal appraisal, allocation of resources, timing, and the system of sanctions and rewards. These formal mechanisms have been directly changing the environment where teachers were able to achieve successful teaching moments and hence offered strong mastery experiences. Also, the power of the social persuasion presumably was enhanced by the prestige and assessive power of the principal: praise or positive approval by an assessor who also had the power to promote and provide resources was presumably more effective at influencing the belief of a teacher about future performance than the like encouragement by a colleague. The great fit and huge PL strength of the model indicated that the behaviour of the principal in a setting with centralised power and a structured appraisal system was a lever of the critical environment in moulding the efficacy beliefs.

The importance and mechanisms of TL

Even though the larger effect was exerted by PL, the TL coefficient (b = .239) was a substantially significant and practically important effect on TSE. Leadership by teachers worked in the form of peer-to-peer mechanisms, vicarious learning, co-planning and common problem solving, and social support, which mitigated negative affective states (isolation and stress). The positive TL effect indicated that the teacher-instigated practices of mentoring a teacher, facilitating a PLC, and peer observation were plausible sources of vicarious experiences (if my colleague can do it, I can), and incremental mastery was supported through collaborative lesson design. In brief, TL played a role in supplementing everyday teaching: it reinforced daily teaching practices and made the modelling and scaffolding available when needed, and principals alone could not offer it. The demand to have the two effects present in the model reflected the usefulness of a dual-path perspective: formal authority and peer agency could each be significant and reinforcing even though their significance requirements were different.

Subgroup follow-up analysis showed that there was significant heterogeneity between geographic and experiential subgroups, and the relative role played by Principal Leadership (PL) and Teacher Leadership (TL) on Teacher Self-Efficacy (TSE) did not differ in all situations. Table 5 shows the disaggregated (by provincial) and teaching experience (<5 years, 5-15 years, and >15 years) standardised effects. The results show that the effects of PL on TSE were most intense in the group of senior teachers and in the more urbanised and centrally resourced teaching conditions as compared to the effects of TL, which were higher in novice teachers and in the school environment which was characterised by fewer resources. In particular, the correlation between TL and TSE (β = .300) was slightly higher among novice teachers (< 5 years) as opposed to the correlation between PL and TSE (β = .280), which leads to the assumption that peer-based leadership could be an important part of development that facilitates early professional confidence.

In their turn, teachers with the experience of more than 15 years demonstrated a much stronger PL impact (β = .360) than TL (β = .210), which is associated with the immanent role of formal authority in promoting the self-efficacy development of more experienced teachers. Geography also made these contextual dynamics clear inter-provincially, with the impact of PL on TSE on the upshot in West Java, which was more urban and better-resourced (β = .345), whereas TL showed a relatively smaller impact (β = .228). Conversely, in South Sulawesi, which is less resourced and more peripheral, the impact of PL decreased (β = -0.300) and the impact of TL increased (β = -0.250), which is a counteracting role of institutional support in which peer collaboration is weak. All these results are indicative of the contingency theory of leadership efficacy: teacher-led collaboration (TL) is an extremely essential provider of self-efficacy in the context of inherently limited formal support, whereas principal-led leadership (PL) is still prevalent among organised, resource-rich, and hierarchical school systems.

Table 5 Subgroup Comparisons: Standardised Effects By Province And Experience

Subgroup	PL → TSE (β)	TL → TSE (β)	Δβ (PL−TL)
West Java	.345	.228	.117
Central Java	.328	.245	.083

South Sulawesi	.300	.250	.050
Experience < 5 yrs	.280	.300	−.020
Experience 5–15 yrs	.335	.240	.095
Experience > 15 yrs	.360	.210	.150

Exploratory moderation and mediation analyses provided new knowledge that was not found in the original model. First, an interaction term (PL x TL) was to be tested to test whether strong teacher leadership mediated the effectiveness of principal leadership. The coefficient of interaction was β = .092 (SE = .038, p = .018), implying the interaction was small but statistically significant: as TL went up, the marginal effect of PL on TSE declined modestly. In practice, this signified some functional replacement – where teacher leadership was strong, the contingent value of lots of extra principal leadership was diluted. Second, a mediation model including an index of collective instructional climate (constructed on items related to collaborative practice) indicated that PL had a direct influence on TSE (direct β = .211) as well as an indirect influence in a model of collective climate (indirect β = .120) of a failure to account for the entire effect of PL. Collective climate also mediated a pathway in TL, but the share of the influence was smaller. These discoveries highlighted the fact that principals could work directly and indirectly through the creation of school conditions that enabled teacher peer processes to thrive. These exploration findings are summarised in Table 6.

Table 6 Exploratory Moderation and Mediation Findings

Analysis	Coefficient (β)	SE	p-value	Interpretation
PL × TL (interaction) → TSE	−.092	.038	.018	TL attenuated PL effect
PL → Collective Climate (β)	.320	.022	< .001	PL fosters climate
Collective Climate → TSE (β)	.375	.020	< .001	Climate predicts TSE
PL indirect via climate	.120	.015	< .001	36% of PL total effect
TL indirect via climate	.052	.012	< .001	22% of TL total effect

Practical lessons and implications

Some practical lessons were taken out of the findings. To begin with, principals were the easiest leverage point to gain rapid, system-wide changes in terms of teacher confidence due to their formal authority to control resources and appraisal systems; interventions that increase the instructional leadership abilities of principals could hence have significant returns. Second, teacher leadership was a strong supportive complement, particularly where increasing the number of novice teachers or where aggregate formal resources in schools were low; formal policies that strategically build teacher leaders would enhance day-to-day teaching change. Third, since teacher leadership partially replaced further principal inputs, a dual approach was recommended: invest in principals where the classroom practice was weak and invest in teacher leadership where the improvements in classroom practice were required fast and sustainable or where the capacities of principals were limited. Fourth, the mediation findings demonstrated that promoting a robust collective instructional climate should be among policy priorities due to its high impact since it is a channel through which both PL and TL could exert influence on TSE. Together, these lessons posited in favour of coordinated leadership growth in which principal training and teacher leader pipelines were connected with investments in collaborative structures. Other projects of similar scale in Malaysia, such as TS25 and Guru Cemerlang, also show the dynamics of empowering principals and collaborating with teachers, which indicates that Indonesian reforms match larger trends of leadership in Southeast Asia.

Although the sample was strong and the findings were evident, the study had a number of constraints that should

be interpreted very carefully, and further studies should be taken. The cross-sectional research design could not assert causal relations regarding the sequence of time; longitudinal or quasi-experiments would be required to validate the causal relations and further to investigate the effects in which leadership transformations lead to the process of long-term efficacy. It used teacher self-report as the measurement tool that may inflate associations because of common method variance; further research must use observational measures of leadership practice and objective measures of instructional change. The moderation result (PL x TL) implied intricate interdependencies which warrant further qualitative and mixed-method investigation to disclose how teacher leadership takes the place of, adds to, or recodes principal influence. Lastly, the subgroup heterogeneity revealed that dependent policy prescriptions would not work; there was a need to have context-sensitive policies. These findings provided practical as well as action-orientated advice to policymakers and school leaders and professional development developers who are interested in the creation of teacher capacity in diverse school settings.

CONCLUSION

The study was able to compare empirically the standardised total effects of Principal Leadership (PL) and Teacher Leadership (TL) on Teacher Self-Efficacy (TSE) in the centralised Indonesian education system that is characterised by bureaucratic hierarchy and administration. The results showed that PL had a stronger predictive value to TSE ($\beta = 0.331$) than TL ($\beta = 0.239$), approximately 38.5% higher in magnitude. This statistically significant difference, which was established by bias-corrected bootstrap testing, reflects the institutional power of principals mostly to influence the confidence and professional functioning of teachers. However, the great role of TL signals a new orientation to distributed leadership, which is in line with the Merdeka Belajar (Freedom to Learn) reform, which favours autonomy and cooperation. The simultaneity of the two effects depicts a model of an education system that is in transition both in terms of hierarchical and participative paradigms and negotiates the changing future of instructional leadership.

This may be further illuminated by a comparative reflection on the education reforms in Malaysia. As part of Pelan Pembangunan Pendidikan Malaysia 2013-2025 (PPPM), there were programmes like Guru Cemerlang and School Improvement Specialist Coach, which were supposed to empower the teachers, but at the same time, the principals were still supposed to be the key players. It was found out in the evaluations that the schools where the principals were highly involved in the promotion of teacher-led initiatives had higher collective efficacy. This is revealed in the findings of Indonesia, where it is evidenced that good change in hierarchical systems is not in eliminating authority but converting it into an enabling facilitative leadership.

Out of such insights appears the so-called Dual-Pathway Leadership Model, which suggests that the best means of expanding the teacher efficacy in the centralised systems is by engaging in simultaneous investment in formal (principal-led) and informal (teacher-led) leadership routes. PL offers vision, resources and legitimacy, whereas TL improves peer collaboration, reflective practice and emotional support. Empirical findings presented in the research indicate that the institutional authority of PL is the key factor that determines mastery experiences and resource allocation, whereas TL reinforces vicarious learning, particularly in teachers at the early stages of their careers or in poorer-resourced ones. At the rural schools in Malaysia under TS25 (Transformasi Sekolah 2025), mentoring and collaborating with teachers by principals demonstrate how more teachers become more motivated and confident – in other words, the concept of distributed leadership can succeed even in a hierarchical setting.

The results of the study require the revision of the role of the principal as not the administrative supervisor, but a leader of leaders. The training of leadership in Indonesia and Malaysia needs to go beyond bureaucratic training towards teaching more on the area of instructional, transformational and distributive leadership. Principals need to be taught that the most effective roles they play are mentoring, individualised involvement, and modellinglifelong learning. An example of this change is in TS25 coaching of principals to empower teachers using shared decision-making and professional learning communities.

Contextual variation, though, is of central importance. Subgroup analysis showed that among novice teachers and in less developed schools, TL will have a greater impact, whereas in urbanised, well-endowed schools, PL will prevail. Therefore, leadership training should be more context-dependent: distributed leadership in the urban schools and instructional leadership direct leadership in the rural environment. Hypothetically, the research

contributes to the knowledge on how the social cognitive theory developed by Bandura functions in the collectivist societies wherein the efficacy is determined through institutional power. As a methodology, it shows that structural equation modelling (SEM) is useful in examining leadership hierarchies. Finally, the research reconstructs educational leadership as an ecosystem and not a hierarchy; teacher efficacy can develop through unity between control and teamwork.

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