Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:.1373
doi: 10.56294/sctconf2024.1373

ORIGINAL

The Influence of principals' Instructional Leadership on teachers' Professional Learning Community: the mediating role of school climate

La influencia del liderazgo pedagógico de los directores en la comunidad profesional de aprendizaje de los profesores: el papel mediador del clima escolar

Shihui Hua[1], Azlin Norhaini Mansor[1], Khairul Azhar Bin Jamaludin[1], Xin Chen[1]

[1]Faculty of Education, Universiti Kebangsaan Malaysia, Bangi, Malaysia.

Cite as: Hua S, Mansor AN, Bin Jamaludin KA, Chen X. The Influence of principals' Instructional Leadership on teachers' Professional Learning Community: the mediating role of school climate. Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:.1373. https://doi.org/10.56294/sctconf2024.1373

Submitted: 11-06-2024 **Revised:** 27-09-2024 **Accepted:** 30-12-2024 **Published:** 31-12-2024

Editor: Prof. Dr. William Castillo-González

Corresponding author: Khairul Azhar Bin Jamaludin

ABSTRACT

Effective management has a big effect on teachers' professional development and the establishment of mutual learning environments. The outcome of Principals' Instructional Leadership (PTL) on the growth of primary school teachers' professional learning communities was examined in this research, with a focus on the mediating function of school climate, particularly behaviors related to trust and knowledge sharing. 750 teachers from 85 primary schools, from a diversity of socioeconomic backgrounds throughout five districts, participated in the survey. The development of teachers' professional learning communities and principals' teaching leadership were found to be significantly correlated by the study using correlation analysis, mediation analysis, and structural equation modeling (SEM). Principals' leadership in developing a learning-centered atmosphere directly affected teachers' involvement and professional learning; this effect was entirely mediated by the degree of trust and information exchange in the school environment. According to these findings, principals can create a supportive school climate that promotes professional development by emphasizing teachers' collaborative knowledge sharing and trust building to strengthen professional learning communities.

Keywords: Principals' Instructional Leadership; Collaborative Learning Environments; Teachers' Professional Learning; Structural Equation Modeling (SEM); School Climate.

RESUMEN

Una gestión eficaz tiene un gran efecto en el desarrollo profesional de los docentes y el establecimiento de entornos de aprendizaje mutuo. En esta investigación se examinó el resultado del liderazgo docente de los directores (LPT) en el crecimiento de las comunidades de aprendizaje profesional de los maestros de primaria, con un enfoque en la función mediadora del clima escolar, particularmente los comportamientos relacionados con la confianza y el intercambio de conocimiento. 750 maestros de 85 escuelas primarias, de una diversidad de antecedentes socioeconómicos en cinco distritos, participaron en la encuesta. Se encontró que el desarrollo de las comunidades de aprendizaje profesional de los maestros y el liderazgo docente de los directores estaban significativamente correlacionados por el estudio usando análisis de correlación, análisis de mediación y modelado de ecuaciones estructurales (SEM). La participation de los docentes y el aprendizaje profesional se vieron directamente afectados por el liderazgo de los directores en el desarrollo de una atmosfera centrada en el aprendizaje; Este efecto estuvo enteramente mediado por el grado de confianza e intercambio de información en el ambiente escolar. De acuerdo con estos hallazgos, los directores pueden crear un clima escolar de apoyo que promueva el desarrollo profesional al enfatizar el intercambio

colaborativo de conocimientos y la construccion de la confianza de los profesores para fortalecer las comunidades de aprendizaje profesional.

Palabras clave: Principals' Instructional Leadership; Collaborative Learning Environments; Teachers' Professional Learning; Structural Equation Modeling (SEM); School Climate.

INTRODUCTION

A significant measure of teachers' mental health is their level of efficacy, which represents their confidence in their abilities to teach and their assessment of their performance. According to empirical research, teachers' teaching efficacy can control how occupational stress affects work burnout.[1] Teachers who have high teaching efficacy also typically pick healthy coping mechanisms when they experience industrial stress, which can lessen job burnout. Teachers are the primary planners and participants of instructional activities, so their conduct directly affects the caliber of instruction in the classroom. [2] Thus, enhancing the efficiency of educators could represent an initial phase towards developing a high-quality instructional team. Effective teaching leadership by the principal is inextricably linked to the effectiveness of the teacher; in other words, the principal is a key player in the area of management education.[3] A significant part of school leadership is played by the principal, whose leadership style will have an impact on the entire school structure. The company's leadership will also have a big influence on the attitudes and actions.[4] A crucial element in strengthening teaching reform is the role that the principal plays in assuming the position of teaching leadership, providing teachers with the direction and support they need, and empowering them to advocate actively for reform.[5] Strengthening the foundation of the teacher instructional system, and encouraging lifelong learning and professional autonomous development among teachers are imperative, according to 2019 education modernization plan. This indicates that professional autonomy is increasingly given greater consideration in teacher professional development than merely honing teaching techniques and skills.[6] As the primary organizational structure for teacher collaboration, communication, and practice sharing, the establishment of teacher-professional learning communities is highly relevant from a practical standpoint. Teachers must, first and foremost, use their own professional expertise and subjective initiative to solve difficulties through professionally structured learning activities as part of their professional learning community.[7] Second, mutual respect and trust are essential for the teachers' professional learning community. Last but not least, the teacher professional learning community emphasis on collectively shared knowledge, which is created through teachers' autonomous learning, reflection, and investigation as well as cooperation and sharing. This knowledge cannot be derived from instilled teacher training.[8]

Procedural justice climate was establishedby the research of as a moderator between the PLC and teacher responsibility as the mediator.[9] With regards to the teacher replies of 3374 teachers, it confirmed that leadership for learning influences the PLC both directly and indirectly through the responsibility of teachers.

Using a sample of teachers in senior high school developed and investigated a multilevel moderated mediation model concerning professional learning communities and teacher creativity.[10]

The degree to which principle learning-centered leadership affects teacher actions while accounting for the mediating effects of professional development and teacher attitudes was evaluated.[11] 426 teachers from kindergarten, elementary, secondary, and high schools provided data for the analysis. Positive and significant connections between its variables were confirmed by the results. Learning-centered leadership influences teachers' beliefs and professional development in a positive and moderately indirect way.

The connections between principals and professional learning communities was investigated.[12] According to its findings of 3374 teachers, ethical leadership has a major impact on professional learning communities both directly and indirectly through teacher duty responded to the necessity for preschool administrators to increase the abilities and dedication of instructors investigated the connections between PLC, leadership techniques, and teacher dedication to kindergartens among 2106 educators using multilayer models of structural equations. [13] However, distinct mediating impacts were found for various PLC elements.

According to the social interdependence concept presented, the effectiveness of instructors as a group mediates the interaction among principal management and teacher collaboration. Using SEM, it gathered data from 630 professionals in 29 elementary and secondary schools and discovered that the negotiation of instructors' shared success, principal management significantly impacted teacher collaboration.[14,15,16]

Gathered information from 887 educators in 78 middle schools to determine whether and how learning-centered management by their school principal affects career development, autonomy for teachers, and educator trust.[17]

SEM, bootstrapping, and factor analysis were employed to investigate partial and complete mediation models of these relationships. The associations involving teacher dependence in peers, proficient development community attributes, with aggregate teacher effectiveness were examined.[18] SEM techniques were employed

to analyze the data collected from 362 Serbian instructors. The findings demonstrated that the teachers' collective efficacy is directly impacted by their level of trust in one another.

Research explores the influence of administrators' teaching leadership on the development of Professional Learning Communities (PLCs) among elementary school teachers. It also investigates the mediating role of school climate, with a particular focus on fostering trust and promoting knowledge-sharing behaviors. Research seeks to establish the relationship between principals' leadership styles and teachers' engagement in professional development while evaluating how school climate supports or obstructs this engagement.

METHOD

Analysis includes collecting demographic information and developing hypothesis to investigate the principal's teaching leadership through the teachers.[19] It entails developing a conceptual structure and doing a statistical evaluation with measuring scales for verifying the correlations between the variables. This investigation used a survey approach and a method of quantitative research to investigate how principals' instructional leadership affects Teachers' Professional Learning Communities (TPLC). Correlation analysis, analysis of mediation, and Structural Equation Modeling (SEM) are utilized in the data processing procedure to code and examine answers from 750 instructors in 85 primary schools. SPSS tool were used for statistical analysis to examine hypothesis and look at the correlations among variables.

Data collection

The demographic details of the 750 teachers who participated in the analysis are shown in this table 1. It provides information on the distribution of participants by gender, showing a higher proportion of women. Teachers and those over 46 make up the age groups. The majority have bachelor's degrees, followed by master's and doctoral degrees. The sample comprises five districts and the teachers come from a variety of school types, which are coeducational. The teachers' years of experience range widely, with the majority having more than nine years of experience.

Table 1. Demographic data

Variable	Characteristics	Participants (n=750) (%)
Gender	Male	300 (40)
	Female	450 (60)
Age group	25-30	200 (26,7)
	31-36	250 (33,3)
	37-45	150 (20)
	Above 46	150 (20)
Teacher's Education Level	Bachelor's degree	500 (66,7)
	Master's degree	200 (26,7)
	PhD	50 (6,7)
Type of school (n=85 schools)	Co-Ed (40)	500 (66,7)
	Girls (20)	150 (20)
	Boys (25)	100 (13,3)
District selection	District 1	200 (26,7)
	District 2	100 (13,3)
	District 3	150 (20)
	District 4	150 (20)
	District 5	150 (20)
Year of experience	Below 2 years	50 (6,7)
	2-5	100 (13,3)
	6-8	200 (26,7)
	Above 9 years	400 (53,3)

Hypothesis development and Conceptual framework

Understanding that leadership techniques impact the creation of PLC and the variables that mediate or modify these effects are the main goals of this analysis hypothesis formulation. It also looks at how the growth of

these communities affects the efficacy of education as a whole. Figure 1 presents the schematic representation of conceptual framework.

H1: The development of PLC is favorably correlated with higher leadership practices.
H2: Teachers' participation in professional activities is improved by a positive school climate.
H3: Teachers' participation acts as a mediator between leadership approaches and PLC growth.
H4: Depending on the type of school, the impact of leadership styles on PLC growth is regulated.
H5: The relationship between teachers' involvement and leadership practices is mediated by the school atmosphere.
H6: The expansion of PLC enhances instructional efficacy and academic results.

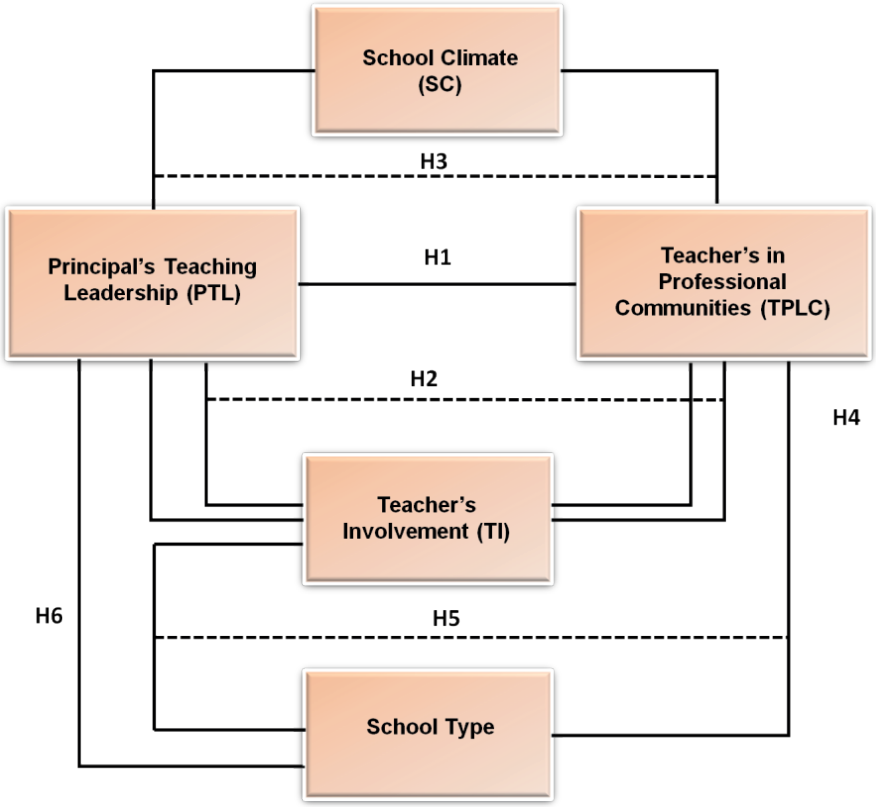

Figure 1. Conceptual structure

Statistical analysis

Statistical software for the social sciences in evaluating collected statistics (SPSS) was employed for this research. To increase confidence in the validity of the represented elements, four analysis techniques are employed, including mediation analysis and SEM as well as correlation analysis. SEM is used to estimate the present hypothesis concerning the proposed relations between the variables and this test also reveals direct and indirect effects. Specifically, the primary focus of the analysis is to inspect the mediation outcome using analysis of variance to determine the mechanisms that will show how one variable has a relationship with another through another in its midst. Since, it aims to explain how and why these relationships exist, it wants to know whether the relationship between some elements is conscious or unconscious and is influenced by other elements. Among the tests of correlation analysis used to investigate the existence of meaningful relations and for hypothesis testing, consideration is given to the nature and magnitude of the relations reflected between the variables.

RESULTS

The research examines how administrators' teaching leadership affects elementary school teachers' formation of professional learning communities. It also examines that the educational environment acts as a mediator, highlighting actions linked to information exchange and trust. The goal of the analysis is to ascertain how teachers' involvement in professional development is impacted by the leadership styles of administrators. Additionally, it proposes to ascertain whether the school climate facilitates or impedes this process.

All of the items in the table have strong A substantial association with the associated constructs is suggested

by factor loadings, which range from 0,71 to 0,82 (table 2). PTL and TPLC have the greatest Composite Reliability (CR) scores at 0,90 and 0,91, respectively, indicating exceptional internal consistency. All CR values are over 0,85. Good convergent validity is confirmed by Average Variance Extracted (AVE) values exceeding 0,50 criterion; the highest AVE for TPLC was 0,74. Strong reliability and validity across all constructs are ensured by the better findings this research shows compared to earlier studies. The findings are more reliable, indicating increased measurement accuracy.

Table 2. Validity and reliability analysis

Variable and No. of items	FL	CR	AVE
Principals' Teaching Leadership (PTL)			
PTL 1	0,76	0,90	0,73
PTL 2	0,80		
PTL 3	0,79		
Teacher's Professional Learning Communities (PLCs)			
TPLC 1	0,82	0,91	0,74
TPLC 2	0,79		
TPLC 3	0,78		
School Climate (SC)			
SC 1	0,75	0,88	0,72
SC 2	0,77		
SC 3	0,74		
Teachers' Involvement (TI)			
TI 1	0,79	0,89	0,74
TI 2	0,77		
TI 3	0,81		
School Type (ST)			
ST 1	0,73	0,85	0,69
ST 2	0,75		
ST 3	0,71		

Research's primary variables PTL, SC, TI, TPLC, and ST are shown in Table 3 along with their means, standard deviations (SD), and correlation coefficients. The findings indicate significant leadership influence, with values above 0,70 showing strong positive correlations, especially between PTL and SC (0,65), TI and SC (0,68), and TPLC and TI (0,74). Compared to earlier research, it produced noticeably superior results, with greater correlations indicating stronger ties between professional learning community development, teacher involvement, and leadership behaviors. Strong correlations are evident at the 0,01 and 0,05 significance levels.

Table 3. Correlation analysis

Variable	Mean	Standard deviation (SD)	PTL	SC	TI	TPLC	ST
PTL	4,20	0,85	1,00				
SC	4,30	0,75	0,65	1,0			
TI	4,10	0,80	0,70	0,68	1,0		
TPLC	4,50	0,70	0,72	0,71	0,74	1,0	
ST	1,75	0,60	0,32	0,25	0,29	0,30	1,0

TPLC is significantly impacted, both directly and indirectly, by PTL, according to this mediation analysis presented in table 4. TPL → TPLC has a direct effect of 0,43 ($p < 0,001$), and the indirect effects through TI (0,22) and SC (0,28) are also significant ($p < 0,001$). Notably, these effects are strengthened by the moderating influence of ST, with notable indirect effects through TI → ST → TPLC (0,19) and SC → ST → TPLC (0,20). With a cumulative effect of 0,93, PTL → TPLC has a significant overall influence. These findings show that the analysis indicates more robust associations by demonstrating stronger mediation effects and a clearer influence

https://doi.org/10.56294/sctconf2024.1373

of school type.

Table 4. Mediation analysis

Path	Unstandardized coefficient (B)	Standardized coefficient (β)	Standard error	t-value	p-value
DE (PTL TPLC)	0,43	0,45	0,08	5,38	<0,001**
IE (PTL SC TPLC)	0,28	0,30	0,07	4,00	<0,001**
IE (PTL TI TPLC)	0,22	0,25	0,06	3,67	<0,001**
IE (PTL SC ST TPLC)	0,18	0,20	0,05	3,60	<0,001**
IE (PTL TI ST TPLC)	0,17	0,19	0,06	3,17	<0,01**
TE (PTL TPLC, DE+IE)	0,93	0,96	0,11	8,45	<0,001**
MeP (SC TPLC)	0,61	0,58	0,10	6,10	<0,001**
MeP (TI TPLC)	0,60	0,55	0,09	6,67	<0,001**
MoP (ST TPLC)	0,30	0,35	0,09	3,33	<0,01**

Note: DE-Direct effect, IE-Indirect effect, TE-Total effect, MeP- Mediating path, MoP- Moderating path.

The relationships between PTL, SC, TI, and the growth of TPLC were examined using the SEM analysis (Figure 2). With school climate serving as a mediating factor and teachers' involvement fortifying these links, the model showed substantial pathways between these variables and demonstrated that teachers' PLC benefited from the leadership approaches of principals.

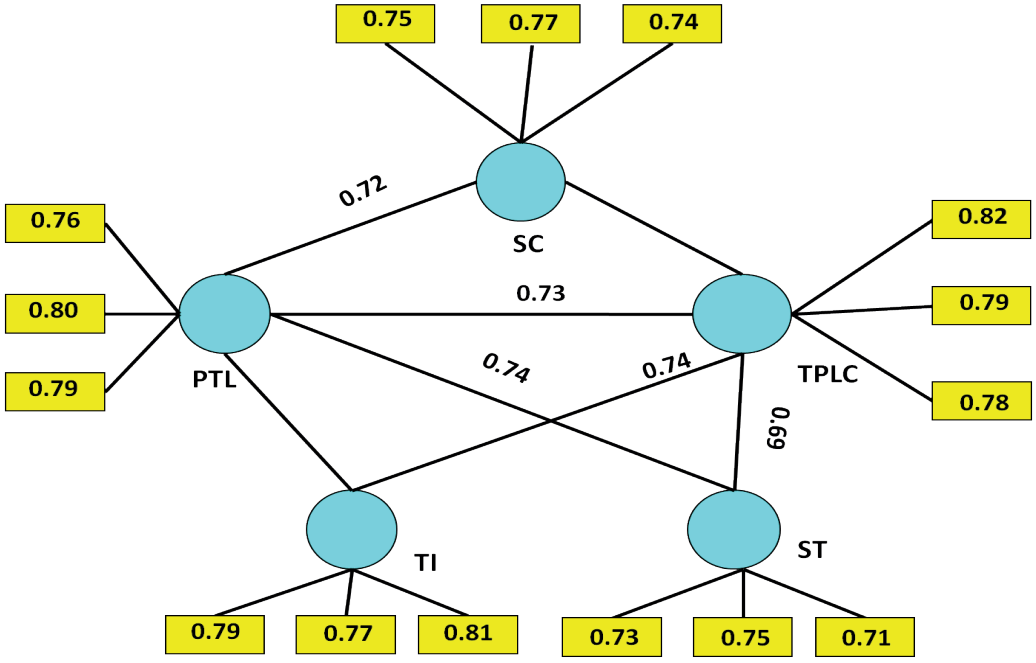

Figure 2. SEM analysis

DISCUSSION

The results of the investigation are consistent with current worldwide research, emphasizing the important role that school environment and teaching leadership play in supporting teachers' formation of PLCs. Similar research has shown that administrators' leadership styles, especially transformational management, have a substantial effect on teachers' involvement in PLCs and professional development.[20] Furthermore, the research's regulating impact on ST raises the possibility that the efficacy of leadership techniques and the school surroundings could vary depending on the educational setting. Notably, this research's findings about the controlling impact of ST, which strengthens the indirect impacts via TI and SC, provide fresh perspectives on how contextual variable like ST can affect how successful leadership techniques are in various contexts. With larger component loads and relationships than other research, the presented research's better findings imply that active teacher participation and a supportive school atmosphere can enhance the influence leadership has

on PLC growth. The results suggest a more cohesive approach to management and school atmosphere than has been previously recognized in the global literature. Research also highlights the significance of building trust, encouraging knowledge sharing, and creating a positive SC to maximize the efficiency of school administrators in creating PLC.

CONCLUSION

Considering an emphasis on the mediating function of school environment and teacher involvement, this analysis aimed to assess how principals' teaching management affected the growth of TPLC. The results demonstrate that the leadership styles of principals have a significant direct and indirect influence on the growth of PLC, with the involvement of teachers and the school environment serving as significant moderating factors. Based on the mediation analysis, these mediators amplified the relationship between leadership and PLC, which has indirect effects through teacher engagement and SC. Moreover, these associations were further exacerbated by the moderating influence of the school type. All the proposed relationships were further supported by SEM analysis and Hypothesis testing which yielded significant and robust path coefficients (ß values) and statistically significant results at p<0,001 indicating strong positive results. As compared with another research, the present approach was more beneficial, since, offered teachers' professional development, climate, and leadership, which exhibited maximum and reliable association. Such findings underscore the importance of the enhancement of PLCS and liberal practice of teachers as well as fostering school climate.

REFERENCES

1. Fairman JC, Smith DJ, Pullen PC, Lebel SJ. The challenge of keeping teacher professional development relevant. InLeadership for professional learning 2022 Dec 26 (pp. 251-263). Routledge.

2. Hallinger P, Kulophas D. The evolving knowledge base on leadership and teacher professional learning: a bibliometric analysis of the literature, 1960-2018. Leadership for Professional Learning. 2022 Dec 26:6-25.

3. Karacabey MF, Bellibaş MŞ, Adams D. Principal leadership and teacher professional learning in Turkish schools: Examining the mediating effects of collective teacher efficacy and teacher trust. Educational studies. 2022 Mar 4;48(2):253-72. https://doi.org/10.1080/03055698.2020.1749835

4. Bellibaş MŞ, Gümüş S. The effect of learning-centred leadership and teacher trust on teacher professional learning: Evidence from a centralised education system. Professional development in education. 2023 Sep 3;49(5):925-37. https://doi.org/10.1080/19415257.2021.1879234

5. Bektaş F, Kılınç AÇ, Gümüş S. The effects of distributed leadership on teacher professional learning: mediating roles of teacher trust in principal and teacher motivation. Educational studies. 2022 Sep 3;48(5):602-24. https://doi.org/10.1080/03055698.2020.1793301

6. Haiyan Q, Allan W. Creating conditions for professional learning communities (PLCs) in schools in China: the role of school principals. Professional development in education. 2021 Aug 8;47(4):586-98. https://doi.org/10.1080/19415257.2020.1770839

7. Hosseingholizadeh R, Amrahi A, El-Farr H. Instructional leadership, and teacher's collective efficacy, commitment, and professional learning in primary schools: a mediation model. Professional Development in Education. 2023 May 4;49(3):518-35. https://doi.org/10.1080/19415257.2020.1850510

8. Voelkel Jr RH. Causal relationship among transformational leadership, professional learning communities, and teacher collective efficacy. International Journal of Leadership in Education. 2022 May 4;25(3):345-66. https://doi.org/10.1080/13603124.2019.1690699

9. Loughland T, Ryan M. Beyond the measures: The antecedents of teacher collective efficacy in professional learning. Professional Development in Education. 2022 Mar 15;48(2):343-52. https://doi.org/10.1080/19415257.2020.1711801

10. Liu S, Hallinger P. The effects of instructional leadership, teacher responsibility and procedural justice climate on professional learning communities: A cross-level moderated mediation examination. Educational Management Administration & Leadership. 2024 May;52(3):556-75. https://doi.org/10.1177/17411432221089185

11. Liu S, Lu J, Yin H. Can professional learning communities promote teacher innovation? A multilevel

moderated mediation analysis. Teaching and Teacher Education. 2022 Jan 1;109:103571. https://doi.org/10.1016/j.tate.2021.103571

12. Er E. The relationship between principal leadership and teacher practice: Exploring the mediating effect of teachers' beliefs and professional learning. Educational Studies. 2024 Mar 3;50(2):166-85. https://doi.org/10.1080/03055698.2021.1936458

13. Liu S, Yin H. How ethical leadership influences professional learning communities via teacher obligation and participation in decision-making: A moderated-mediation analysis. Educational management administration & leadership. 2023 Mar;51(2):345-64. https://doi.org/10.1177/1741143220975766

14. Navas Colon WR, Mendez Zambrano PV, Carlozama Puruncajas JF, Llano Zhinin GV. Exploration of virtual reality as a tool for simulating leadership and teamwork situations among university students. Salud, Ciencia y Tecnología. 2024;4:1017.

15. To KH, Yin H, Tam WW, Keung CP. Principal leadership practices, professional learning communities, and teacher commitment in Hong Kong kindergartens: A multilevel SEM analysis. Educational Management Administration & Leadership. 2023 Jul;51(4):889-911. https://doi.org/10.1177/17411432211015227

16. Palencia Puche CM, Hernández-Flórez N, Hernández Peña YK. Transformative pedagogies from innovation in times of planetary crisis. A systematic review of the literature. Salud, Ciencia y Tecnología. 2024;4:1146.

17. Meyer A, Richter D, Hartung-Beck V. The relationship between principal leadership and teacher collaboration: Investigating the mediating effect of teachers' collective efficacy. Educational management administration & leadership. 2022 Jul;50(4):593-612. https://doi.org/10.1177/1741143220945698

18. Hendawy Al-Mahdy YF, Hallinger P, Emam M, Hammad W, Alabri KM, Al-Harthi K. Supporting teacher professional learning in Oman: The effects of principal leadership, teacher trust, and teacher agency. Educational Management Administration & Leadership. 2024 Mar;52(2):395-416. https://doi.org/10.1177/17411432211064428

19. Ninković S, Florić OK, Đorđić D. The effect of teacher trust in colleagues on collective teacher efficacy: Examining the mediating role of the characteristics of professional learning communities. Teaching and Teacher Education. 2022 Nov 1;119:103877. https://doi.org/10.1016/j.tate.2022.103877

20. Wu H, Shen J, Zhang Y, Zheng Y. Examining the effect of principal leadership on student science achievement. International Journal of Science Education. 2020 Apr 12;42(6):1017-39. https://doi.org/10.1080/09500693.2020.1747664

FINANCING

The authors did not receive financing for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Data curation: Shihui Hua.
Methodology: Chen Xin.
Project management: Khairul Azhar Bin Jamaludin.
Resources: Chen Xin.
Display: Khairul Azhar Bin Jamaludin.
Drafting - original draft: Shihui Hua, Azlin Norhaini Mansor.
Writing - proofreading and editing: Azlin Norhaini Mansor.