Kasetsart Journal of Social Sciences 43 (2022) 353–360

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

The effects of principal instructional leadership, collective teacher efficacy and teacher role on teacher self-efficacy: A moderated mediation examination

Thomrat Siriparp, Prompilai Buasuwan*, Suchada Nanthachai†

Department of Educational Administration, Faculty of Education, Kasetsart University, Bangkok 10900, Thailand

Article Info

Article history:
Received 18 May 2021
Revised 11 July 2021
Accepted 21 July 2021
Available online 30 April 2022

Keywords:
collective teacher efficacy,
moderated mediation,
principal instructional leadership,
teacher role,
teacher self-efficacy

Abstract

This study investigated the moderating effect of teacher role between principal instructional leadership and teacher self-efficacy relationships. A random sample was selected from 120 teachers in a private school in Nakhonsawan province, Thailand. The data were analyzed based on Regression Path Model using PROCESS macro version 3.5. The results showed that the principal instructional leadership affected teacher self-efficacy via collective teacher efficacy moderated by teacher role (1 = managerial role, 0 = non-managerial role). For teachers with a managerial role, the indirect effect was 0.481. For teachers with a non-managerial role, the indirect effect was 0.310. The moderating effect in the model was 0.376. All independent variables explained the variance in teacher self-efficacy, accounting for 63.2 percent. The results enhance the theoretical knowledge and empirical evidence regarding the relationship between principal instructional leadership and teacher self-efficacy, emphasizing the moderated mediating effect of teacher role. Moreover, the study contributes to school strategy in terms of enhancing teacher performance in private school contexts.

Introduction

Principal instructional leadership has been an important topic in educational research. It is also a key foundation for an effective school. In 1980, goal-oriented leadership was implemented amidst controversy, but it proved effective in bringing about improvement in students' academic performances. This later came to be called "instructional leadership." In the following years, the approach was also introduced to teachers, creating a better learning environment and relationship with students (Hallinger, 2010).

One of the challenges in educational research was distinguishing the impact of the individual from the system. Sebastian, Allensworth, Wiedermann, Hochbein, and Cunningham (2019) investigated the relationship between principal instructional leadership and overall student academic rating from a set of secondary databases

* Corresponding author.
E-mail address: prompilai.b@ku.th (P. Buasuwan).
† Co-first authors.
E-mail address: feduypnc@ku.ac.th (S. Nanthachai).

https://doi.org/10.34044/j.kjss.2022.43.2.12
2452–3151/© 2022 Kasetsart University.

of schools in Chicago, USA. This study found that a significant part of student academic record was from individual factors (roughly 82%), while school influence was a mere 18 percent. It implied race, gender, and the type of classroom were important to students' learning experiences. Additionally, principal instructional leadership accounted for approximately 4 percent of students' overall academic outcomes. Many similar studies before were performed, but this study was significant in confirming the impact of influencing factors, regardless of the period of investigation. That study emphasized teaching quality and creating a suitable learning environment, and it also supported principal instructional leadership as an indirect factor in overall student learning experience.

Therefore, teaching quality (or teaching outcomes) was the key factor linking principal instructional leadership with students. Bandura (1997) reported that students with a high sense of self-efficacy showed better academic performance than others. Moreover, teachers who demonstrate this trait can transfer knowledge and mediating process very effectively, do not avoid challenges and difficulties, and find alternative teaching methods for mediating the educational process.

Although principal instructional leadership has been debated for over four decades, the approach has only recently been implemented in Thailand as a way to strengthen professional standards and ethics. Junsopa and Visessiri (2017) reviewed studies related to instructional leadership between the period 1999 and 2015, finding 90 research publications. These ranged from 23 doctoral dissertations and 67 master's theses that examined instructional leadership modeling; correlation studies between teachers and students; factor affecting management, teaching, and learning; and quality assurance and teacher performance. Despite this plethora of instructional leadership studies, causal relationships among these factors have not been established.

Given this failure, the research framework for this study applied two main theories. The first was instructional leadership by Hallinger and Wang (2015), and the second was self-efficacy by Bandura (1997). The study also drew on other findings from recent literature (Çalik, Sezgin, Kavgaci, & Kilinç, 2012; Cansoy & Parlar, 2018; Kurt, Beycioglu, Duyar, & Çalik 2011). This study examined the impact of principal instructional leadership on teacher self-efficacy via collective teacher efficacy, the shared beliefs among teachers. Hallinger and Wang (2015) called it a school-level mediator. However, Lev and Koslowsky (2009) found that some of these effects were different for teachers who exhibited a managerial role compared to teachers who did not. Moreover, this study casts light on the direction and process of schoolwork and suggests guidelines for improving professional development activities for schoolteachers. The research framework is shown in Figure 1.

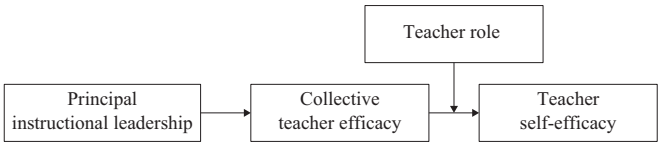

Figure 1 Research conceptual framework

Hence, this study tested a hypothetical model that explored the direct and indirect relationship between principal instructional leadership, collective efficacy, and teacher self-efficacy. It identified powerful mediators at the school level that contribute to increasing teacher self-efficacy and was amendable to leadership action. Besides, teachers with different roles, namely, managerial vs non-managerial staff, would show different mediating effects.

Literature Review

Instructional Leadership

Instructional or academic leadership has a long history, stretching as far back as the 18th century. Initially, leadership was confined to the principal or top managers. Scholars and researchers focused their attention on school effectiveness as the outcome of a strong instructional leadership ethos. In the 19th century, the focus shifted to educational administration as the key to better school management based on the concept of transformational leadership. Then, in the 20th century, after a series of developments, the concept of leadership for learning came to the fore (Hallinger, 2010; 2011).

Although the definition of instructional leadership differed at different periods, the core concept has always been about helping students through proper management. Leithwood (1994) defined instructional leadership as a method that focused the attention of the teacher on activities that helped students to learn. Hallinger (2010), in turn, saw instructional leadership as actions by the head of the school or department head that impacted the academic curriculum in a manner that promoted a learning environment.

Teacher Self-Efficacy

Both teacher self-efficacy and teacher collective efficacy originated from Bandura's (1977) concept of self-efficacy, which was originally more limited than recent ideas such as student self-efficacy, self-efficacy for learning mathematics, and so on. Teacher self-efficacy was conceived as an effect of the educational environment, such as task-related and extracurricular activities.

Teacher self-efficacy is specific to teacher expectations of students' learning progress but exclusive of the students' motivation (Tschannen-Moran & Hoy, 2007). The concept also includes physical and mental responses that facilitate a more resilient attitude (Guidetti, Viotti, Bruno, & Converso, 2018). Teachers with high self-efficacy can perform under pressure, withstand difficulties, and face challenges. Students with self-efficacy perform well academically and are willing to participate in extracurricular activities. In contrast, teachers with low levels of self-efficacy tend to avoid challenges and succumb to pessimism, which eventually leads to low performance (Bandura, 1997). Tschannen-Moran and Hoy (2007) stated that teacher self-efficacy comprises three components: (1) instructional strategies that emphasize versatility of content and teaching methods; (2) classroom management that fosters a learning environment; and (3) student engagement that encourages students to learn.

Teacher Collective Efficacy

Bandura (1997) explained collective efficacy as a collective sense of an interactive dynamic between work and strategy as a team. While self-efficacy is determined by individual skill and effort, team-efficacy relies on acknowledgment of member efficacy or group reference as the key factor for success, rather than self-reference or aggregate self-efficacy. Although both self-efficacy and team-efficacy are linked, individual self-efficacy can be influenced by team-efficacy and vice versa.

Collective teacher efficacy is identified as the perception of a group of teachers that influences the learning experiences of students (Tschannen-Moran & Barr, 2004 as cited in Qadach, Schechter, & Da'as, 2019). Team or collective efficacy exhibits similar roots as self-efficacy since self-accomplishment, indirect experiences, persuasion, and physical and mental conditions influence success as a whole. Goddard, Hoy, and Hoy (2000) identified two main components of teacher collective efficacy: (1) analysis of the teaching task –i.e., type, teaching materials, facility, challenge, and difficulty; and (2) assessment of teaching competence to evaluate teaching methods and skills development for learning experience.

Teacher Role

In this study, teacher role was introduced to as a moderator in the relationship between collective teacher efficacy and teacher self-efficacy. Bandura (1997) argued that self-efficacy was more likely to be affected by level, position, or function within an organization. It implied that teachers who hold different positions in a school would have different self-efficacy levels. Additionally, Lev, and Koslowsky (2009) found the moderating evidence of teacher role was categorized by management function, the so-called managerial and non-managerial role. They explained that teachers would become more empowered when their feelings of collective efficacy increased. This may lead teachers to work more purposefully to enhance student learning.

Methodology

Sample

The sample comprised 120 private schoolteachers (26 male, 94 female) with a mean age of 35.558 years (SD = 11.517). The participants taught basic education (K-12) for an average of 10.796 years (SD = 11.323). Twenty-seven of them held work positions such as principal assistances, head teachers in all subject areas, head teachers in school projects, which were classified as managerial staff, and the others were non-managerial staff. The sample size criteria employed in this study were based on a regression approach with minimum 100 cases (Hair, Black, Babin, & Anderson, 2019) and 20 percent compensation for missing data.

Research Instruments

A two-part questionnaire was used for collecting data. The first part collated basic information of respondents, such as gender, age, years of work, and work positions. The second part was rating scale questions that assessed principal instructional leadership, collective teacher efficacy, and teacher self-efficacy. It was noted that the principal instructional leadership was assessed by teachers' perception to decrease self-assessment reports by the principal.

Principal instructional leadership

Principal Instructional Leadership was measured with the Principal Instructional Leadership Management developed by Hallinger and Murphy (1985). This scale consists of three subscales—defining the school mission, managing the instructional program, and developing the school learning climate. Teachers assessed how often the principal implemented a behavior or practice. Each item was rated on a Likert-type scale ranging from 1 (almost never) to 5 (almost always). The items were modified for the private school context of this study. The Cronbach's alpha for this scale was .872. The construct validity was tested and indicated good fit (χ^2 = 0.012, df = 1, *p*-value =.273, RMSEA = .000, CFI = 1.000, SRMR = .057).

Teacher self-efficacy

Teacher self-efficacy was measured using Yingwanna's 9-item teacher efficacy scale for Thai teachers. Yingwanna (2012) is based on the Teacher Efficacy Scale of Tschannen-Moran and Hoy (2001). This scale consists of three subscales–instructional strategies, classroom management, and student engagement. Teachers rated their agreement with each item ranging from 1 (strongly disagree) to 5 (strongly agree). Regarding internal consistency, the Cronbach's alpha was .828. The construct validity was tested and indicated good fit (χ^2 = 0.431, df = 1, *p*-value = .501, RMSEA = .000, CFI = 1.000, SRMR = .052).

Collective teacher efficacy

Collective teacher self-efficacy was measured using Yingwanna's 12-item collective teacher efficacy scale for Thai teachers. Yingwanna (2012) is based on the Teacher Collective Efficacy Scale created by Goddard et al. (2000). This scale consists of two subscales–assessment of teaching task and assessment of teaching competence. Teachers rated their agreement with each item ranging from 1 (strongly disagree) to 5 (strongly agree). Regarding internal consistency, the Cronbach's alpha was .901. The construct validity was tested and indicated good fit (χ^2 = 1.200, df = 1, *p*-value = .273, RMSEA = .041, CFI = 0.998, SRMR = .022).

Data Collection

With permission, information was collected through a survey without revealing names and titles. Responses to this survey would not affect current evaluation and tasks and would be used for academic purposes only.

Data Analysis

Moderated mediation analysis was done using the PROCESS macro developed by Hayes (2018) for SPSS. This is a user-friendly software for estimating a regression-based model, with no need to learn new computer language and includes special options for assumption screening. This study also used HC4 for heteroscedasticity-consistent standard error, mean centering on collective teacher efficacy, and bootstrapping for mediation testing. Thus, an analytical model was constructed to examine (1) the effects of principal instructional leadership on teacher self-efficacy; (2) whether the effects of collective teacher efficacy on teacher self-efficacy depend on teacher role; and (3) the effects of principal instructional leadership on teacher self-efficacy through collective teacher efficacy depending on teacher role. This approach enabled an examination of the direct and indirect effects of an independent variable on a dependent variable via a mediator, as well as a moderating effect of a particular relationship. All three hypotheses were tested simultaneously. Bias corrected bootstrap confidence intervals were generated for moderated mediating effects at +1SD, mean and - 1SD based on 5,000 bootstrap samples, as this approach has been recommended for examining moderated mediation models (Hayes, 2018; Preacher & Hayes, 2008). Then, significant conditional indirect effects of observation were estimated according to the guidelines outlined by Hayes (2018). Point estimates were considered significant at the 95 percent confidence interval.

Results

Preliminary Analyses

Descriptive statistics and the intercorrelations for all study variables are presented in Table 1. Independent sample t-tests and ANOVA showed no significant differences in mean scores according to gender, teaching experience, and teacher role. It is apparent from the results that the variables attained acceptable reliability. As shown in Table 1, positive and significant correlations among continuous variables, principal instructional leadership (PIL), collective teacher efficacy (CTE), teacher self-efficacy (TEF) were obtained. The correlation coefficients ranged .334 to .768 ($p < .05$).

Table 1 Scale Reliabilities, descriptive statistics, and intercorrelations

Variable	*M*	*SD*	1	2	3	4	5
1. PIL	4.669	0.275	(.872)				
2. CTE	4.269	0.384	.369**	(.901)			
3. TEF	4.319	0.374	.334**	.768**	(.828)		
4. Trole x CTE	-	-	.181*	.448**	.462**	-	
5. Trole	-	-	.140	.096	.155	.275**	-

Note: Scale reliabilities (Cronbach's alpha) are shown on the diagonal. *M* = mean; *SD* = standard deviation; PIL = principal instructional leadership; CTE = collective teacher efficacy; TEF = teacher self-efficacy; Trole = teacher role.
*$p < .05$, **$p < .01$.

Analysis of Moderated Mediation

The resulting coefficients and model summary information are presented in Table 2. The best-fitting OLS regression models are shown in Equation (1) and (2):

$$\widehat{\text{CTE}} = -2.117 + 0.454\ \text{PIL} \quad (1)$$

$$\widehat{\text{TEF}} = 3.444 + 0.178\ \text{PIL} + 0.683\ \text{CTE} - 0.063\ \text{Trole} + 0.376\ (\text{Trole x CTE}) \quad (2)$$

It appears that the more instructional leadership behavior is perceived by teachers, the more the CTE increases (b =.454). Furthermore, the effect of CTE on teacher TEF is contingent on teacher role, as evidenced by the statistically significant interaction between Trole and CTE in the model of teacher self-efficacy (b = 0.376, $p < .05$). The regression coefficients for CTE and TEF are moderating effects with their product in the model. In this model, this effect is positive and statistically different from zero (b = 0.683, $p < .05$). This study noted that the effect of PIL on TEF was not statistically significant. The amount of variance in TEF is accounted for 62.5 percent, with 2 percent coming from the interaction term (Trole x CTE).

Results of moderated mediation are shown in Table 3. For teacher self-efficacy, teacher role significantly moderates the mediation of PIL via CTE. Further analysis shows that this is significant for managerial staff (b = 0.481, 95% CI [0.182, 0.813]) and non-managerial staff (0.310, 95% CI [0.120, 0.497]. Figure 2 presents the moderating effect of teacher role between CTE and TEF–the dark line represents the managerial staff, while the dotted line represents the non-managerial staff. The slope indicates the magnitude of moderating effects, in which the managerial staff is higher than the other (b = 1.059 and 0.683, respectively).

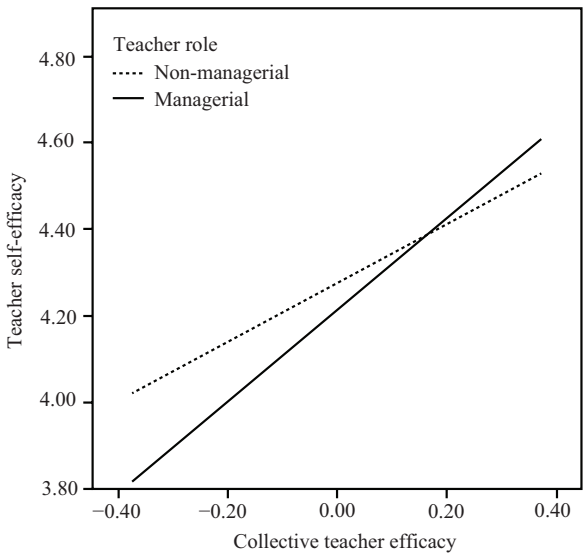

Figure 2 A visual representation of the moderation of the collective teacher efficacy on teacher self-efficacy by teacher role

Table 2 Model coefficients for the moderated mediation model

Antecedent	Consequent					
	CTE			TEF		
	b	SE	*p*	b	SE	*p*
PIL	0.454	0.148	.003	0.178	0.098	.071
CTE	-	-	-	0.683	0.072	.000
Trole	-	-	-	−0.063	0.066	.339
Trole x CTE	-	-	-	0.376	0.182	.042
Constant	−2.117	0.693	.003	3.444	0.462	.000
	$R^2 = .112$			$R^2 = .625$		
	$F(1,118) = 9.345$, $p = .003$			$F(4,115) = 44.400$, $p = .000$		

Table 3 Constructing the moderated mediation effect of PIL on TEF through CTE for teacher role

Teacher role	PIL → CTE (a)	CTE → TEF (b)	PIL → TEF (a x b)
Managerial staff (w = 1)	0.454	1.059	0.481, 95% CI [0.182, 0.813]
Non-managerial staff (w = 0)	0.454	0.683	0.310, 95% CI [0.120, 0.497]

Note: Unstandardized regression coefficients were reported. Bootstrapped 95% confidence intervals. LL = lower limit; CI = confidence interval; UL = upper limit.

Aligning with the research conceptual framework, all the statistical results were input into a moderated mediation model, as shown in Figure 3.

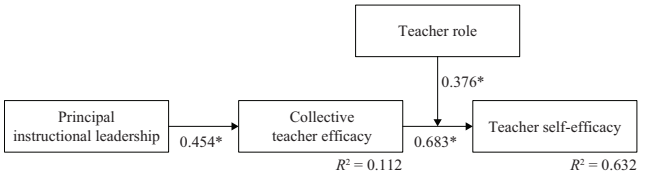

Figure 3 Moderated mediation model
Note: R^2 = explained variance. Solid lines indicate significant relationship ($p < .05$); non-significant relationship is omitted from the figure.
*$p < .05$.

Discussion

The findings of this study were divided into two parts. The first part shows that the influence of PIL on teacher self-efficacy is related to CTE, which was perception arising from team interaction. Hallinger and Wang (2015) described the instructional leadership concept as an interaction in a dynamic relationship between principal and teachers toward school activity, rather than a direct interaction with an individual teacher, as demonstrated through a common objective between principal and teachers and supervising curriculum. These activities strengthen the relationships between the principal and the teachers and create CTE in the process. The influence of the leadership role on teacher development was categorized into collaborative activity, collective focus on student learning, reflective dialog, and de-privatized practice (Zheng, Yin, & Li, 2018). Additionally, considering the direct and indirect effects of leadership role on teacher self-efficacy, only indirect effects were statistically significant. This suggests the importance of mediating effect of CTE between PIL and TEF, which may be described as perfect mediation.

The second part is the effect of teacher role on the relationship between PIL and teacher self-efficacy. We found that teachers with a managerial role demonstrated such effects higher than teachers who played no part in managerial responsibility. This explained the differences in self-efficacy between teachers (Lev & Koslowsky, 2009). Bandura (1997) noted that the source of self-efficacy would be driven from collective efficacy, an environment that interacts with teachers' perception and leads to teacher self-efficacy.

Conclusion and Recommendations

This study adds to the research on how principal instructional leadership contributes to teacher self-efficacy. Collective teacher efficacy was found to be positively related to teacher self-efficacy as a mediator. However, the mediating aspects were found to vary between managerial staff and non-managerial staff, suggesting that teacher role was a moderator in this study. The following recommendations arise from these findings.

Practical Implications

With respect to moderated mediation, two policies are proposed. First, activities that promote group cooperation such as professional learning community (PLC), team based-learning and coaching and monitoring systems are essential to improve teacher quality. This is because the mediation between principal instructional leadership and teacher self-efficacy suggests that collective teacher efficacy is an important factor. Second, school principal should assign head teachers to transfer workload and set the foundation for leadership succession. Another strategy is work rotation to ensure all-rounder leaders who will become valued personnel in the future. Such moderated mediation is influenced by the head teacher. This strategy is especially useful for a private organization that demonstrates high work flexibility because of the high performing organizational structure. Even under the bureaucracy system, public organizations would consider these strategies aligned with the teaching career path.

Suggestion for Future Work

Expanding the scope of the research framework and conducting a more in-depth analysis is possible because not only did this study identify factors that influence self- and group efficacy, but it also suggested other possible outcomes. For example, decreasing the intention to leave (Qadach et al., 2019), and improving relationships among peers (Cansoy, Parlar, & Polatcan, 2020), which lead to better performance (Bandura, 1997) and subsequently benefit the school (Guidetti et al., 2018). The study also further identified principal instructional leadership to teacher self-efficacy through the reciprocal relationship or multi-level modeling, which are more complex but reasonable in explaining the situations in social science research. An additional benefit from this study is the information that can be used to identify the statistical significance of each driving factor and construct academic policies that eventually lead to large-scale changes.

Conflict of Interest

There is no conflict of interest.

Acknowledgments

This research was supported by the Kasetsart University Research and Development Institute (KURDI), Kasetsart University, Thailand.

References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W. H. Freeman and Company.

Çalik, T., Sezgin, F., Kavgaci, H., & Kilinç, A. Ç. (2012). Examination of relationships between instructional leadership of school principals and self-efficacy of teachers and collective teacher efficacy. *Educational Sciences: Theory & Practice*, *12*(4), 2498–2504. Retrieved from https://files.eric.ed.gov/fulltext/EJ1002859.pdf

Cansoy, R., & Parlar H. (2018). Examining the relationship between school principals' instructional leadership behaviors, teacher self-efficacy, and collective teacher efficacy. *International Journal of Educational Management*, *32*(4), 550–567. doi: 10.1108/IJEM-04-2017-0089

Cansoy, R., Parlar, H., & Polatcan, M. (2020). Collective teacher efficacy as a mediator in the relationship between instructional leadership and teacher commitment. *International Journal of Leadership in Education*, 1–19. doi: 10.1080/13603124.2019.1708470

Goddard, R. D., Hoy, W. K., & Hoy, A. W. (2000). Collective teacher efficacy: Its meaning, measure, and impact on student achievement. *American Educational Research Journal*, *37*(2), 479–507. doi: 10.3102/00028312037002479

Guidetti, G., Viotti, S., Bruno, A., & Converso, D. (2018). Teachers' work ability: A study of relationships between collective efficacy and self-efficacy beliefs. *Psychology Research and Behavior Management*, *11*, 197–206. doi: 10.2147/PRBM.S157850

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, P. E. (2019). *Multivariate data analysis*. New York, NY: Pearson Education Limited.

Hallinger, P. (2010). Leading educational change: Reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education*, *33*(3), 329–352. doi: 10.1080/0305764032000122005

Hallinger, P. (2011). Leadership for learning: Lessons from 40 years of empirical research. *Journal of Educational Administration*, *49*(2), 125–142. doi: 10.1108/09578231111116699

Hallinger, P., & Murphy, J. (1985). Assessing the instructional management leadership behavior of principals. *The Elementary School Journal*, *86*(2), 272–309. doi: 10.1086/461445

Hallinger, P., & Wang, W. C. (2015). *Assessing instructional leadership with the principal instructional management rating scale*. Zug, Switzerland: Springer International Publishing.

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). New York, NY: The Guilford Press.

Junsopa, N., & Visessiri, P. (2017). A synthesis of research about instructional leadership. *An Online Journal of Education*, *11*(2), 305–319. Retrieved from https://so01.tci-thaijo.org/index.php/OJED/article/view/84149/66987

Kurt, T., Beycioglu, K., Duyar, I., & Çalik, T. (2011). "Are we legitimate yet?" *Journal of Management Development*, *31*(1), 71–86. doi: 10.1108/02621711211191014

Lev, S., & Koslowsky, M. (2009). Moderating the collective and self-efficacy relationship. *Journal of Educational Administration*, *47*(4), 452–462. doi: 10.1108/09578230910967437

Leithwood, K. (1994). Leadership for school restructuring. *Educational Administration Quarterly*, *30*(4), 498–518. doi: 10.1177/0013161X94030004006

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavioral Research Methods*, *40*(3), 879–891. doi: 10.3758/BRM.40.3.879

Qadach, M., Schechter, C., & Da'as, R. A. (2019). Instructional leadership and teachers' intent to leave: The mediating role of collective teacher efficacy and shared vision. *Educational Management Administration & Leadership*, *48*(4), 617–634. doi: 10.1177/1741143219836683

Sebastian, J., Allensworth, E., Wiedermann, W., Hochbein, C., & Cunningham, M. (2019). Principal leadership and school performance: an examination of instructional leadership and organizational management. *Leadership and Policy in Schools*, *18*(4), 591–613. doi: 10.1080/15700763.2018.1513151

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783–805. doi: 10.1016/S0742-051X(01)00036-1

Tschannen-Moran, M., & Hoy, A. W. (2007). The differential antecedents of self-efficacy beliefs of novice and experienced teachers. *Teaching and Teacher Education*, *23*(6), 944–956. doi: 10.1016/j.tate.2006.05.003

Yingwanna, S. (2012). *The roles of collective and self-efficacy as mediating variables between transformational leadership and organizational commitment of teachers: As analysis of multi-level structural equation model* (Unpublished doctoral dissertation). Chulalongkorn University, Bangkok, Thailand. [in Thai]

Zheng, X., Yin, H., & Li, Z. (2018). Exploring the relationships among instructional leadership, professional learning communities and teacher self-efficacy in China. *Educational Management Administration & Leadership*, *47*(6), 843–859. doi: 10.1177/1741143218764176