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Title of article: Exploring the mediating effects of trust on principal leadership and teacher professional learning in Hong Kong primary schools
Title of Journal: Educational Management Administration & Leadership - 2016, 44(1), pp. 20-42.

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Exploring the mediating effects of trust on principal leadership and teacher professional learning in Hong Kong primary schools

Educational Management
Administration & Leadership
2016, Vol. 44(1) 20–42
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sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1741143214558577
emal.sagepub.com



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Abstract

This study attempted to identify effects of trust between principal leadership and teacher professional learning in Hong Kong primary schools. To verify the potential mediating effects of trust as a component of school capacity, survey data with a sample of 970 teachers from 32 local primary schools was used. Two questionnaires were combined to investigate principal leadership and school capacity in the schools. Baron and Kenny's four-step causal process for mediation analysis was employed to have a preliminary inquiry. To compensate weaknesses of the orthodox regression based approach, significance of the mediating effects of trust were tested using the Sobel's test and bootstrapping method. Next, the seven core sets of principal leadership practices were used as multiple predictors, and mediating effects of trust between them and teacher professional learning were also examined. The findings affirmed the role of faculty trust as a mediator between principal leadership and teacher professional learning in Hong Kong primary schools.

Keywords

Leadership, management, teacher learning, school capacity

A recurring theme in research on school leadership is evident in persisting efforts to discern how leadership focused on different facets of the organizational system impacts teaching and learning processes, teacher commitment, student learning, school quality and education equity (Bossert et al., 1982; Bridges, 1982; Hallinger and Heck, 1998; Leithwood and Sun, 2012; Pitner, 1988). Early research within this intellectual space examined the effects of principal leadership that employed varying degrees of initiating structure and consideration in interactions with teachers (see Boyan, 1988; Bridges, 1982; Campbell and Faber, 1961). A parallel line of research focused more specifically on identifying the contributions that principals' "education-focused" leadership

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practices made to teaching and learning (Bossert et al., 1982; Bridges, 1967; Erickson, 1979; Gross and Herriot, 1965; Hallinger and Heck, 2011; Hallinger and Murphy, 1985; Marks and Printy, 2003). Starting in the 1990s, studies of transformational and transactional school leadership (Leithwood, 1994; Leithwood and Jantzi, 2000; Leithwood and Sun, 2012; Silins, 1994) employed contrasting conceptual models in continuing attempts to understand how leaders manage interpersonal relationships and shape organizational conditions to achieve results in schools. During the past decade, scholars have reviewed and synthesized findings from these related but distinct lines of theoretical and empirical inquiry (e.g. Hallinger, 2003; Leithwood et al., 2008; Louis et al., 2010; Mulford and Silins, 2003; Robinson et al., 2008; Witziers et al., 2003).

These syntheses have pointed to the mutually reinforcing influence of first-order leadership practices that focus directly on developing teaching and learning quality and second-order practices that build the capacity of schools to sustain innovation and continuous improvement (Bryk and Schneider, 2003; Hallinger, 2003; Leithwood et al., 2008, 2010a; Louis et al., 2010; Mulford and Silins, 2003; Robinson et al., 2008). More specifically, this research suggests that successful school leadership focuses *both* upon curriculum, instruction and learning processes *and* upon broader staff motivation and capacity development (Bryk and Schneider, 2003; Hallinger and Heck, 2010; Leithwood and Day, 2007; Leithwood et al., 2010b; Louis et al., 2010; MacBeath and Cheng, 2008; Mulford and Silins, 2003, 2009; Spillane, 2006). With this conclusion in mind, recent empirical efforts have tended to employ conceptual models that incorporate both “technical” and “relational” dimensions of school leadership (e.g. see Li, Hallinger and Ko, in press.; Hallinger and Heck, 2010; Leithwood and Day, 2007; Leithwood et al., 2010b; Marks and Printy, 2003; Printy et al., 2009; Sebastian and Allensworth, 2012; Thoonen et al., 2012; Walker and Ko, 2011).

Within the relational sphere of leadership practices, scholars have increasingly focused on “trust” as a mediating or enabling condition through which leadership impacts improvement in teaching and learning (e.g. Bryk and Schneider, 2002, 2003; Bryk et al., 1999; Goddard et al., 2000; Hoy et al., 1992, 2006; Leithwood and Beatty, 2008; Leithwood et al., 2008, 2010a; Louis et al., 2010; Slegers et al., 2002; Tarter et al., 1995; Wahlstrom and Louis, 2008). For example, Bryk and Schneider’s (2003) research in Chicago found that “schools with little or no trust have almost no chance of improving . . . [In contrast] elementary schools with high social trust were much more likely to demonstrate marked improvements in student learning” (44). Leithwood and Beatty (2008) also emphasized the necessity for leaders to tune into teacher emotions as a means of building trust and commitment to change in the school (see also Beatty, 2000; Donaldson, 2001; Leithwood and Jantzi, 2000; Leithwood et al., 2010a, 2010b; Louis et al., 2010; Saphier and King, 1985).

The current study sought to extend this line of research by examining the relationship between principal leadership, faculty trust and teacher professional learning in Hong Kong primary schools. The specific purpose of the study was to examine the nature of the role that trust plays as a mediator of principal leadership efforts aimed at enhancing teacher professional learning. The research explored this issue through the analysis of survey data collected from teachers in 32 primary schools in Hong Kong.

The contributions of this research lie in its potential for further illuminating the “paths” (Hallinger and Heck, 1998; Leithwood et al., 2010a, 2010b) through which school leadership impacts teaching and learning. As noted above, an accumulating body of research highlights faculty trust as a potentially necessary though insufficient condition for bringing about school change and improvement (Bryk and Schneider, 2002, 2003). This research offers a detailed empirical examination of principal leadership, trust and teachers’ professional learning in a cultural and

institutional context that differs substantially from virtually all other reports in this domain of the educational leadership literature.

Theoretical perspective

In this section we establish the conceptual model that guided this empirical study. Then we review theoretical and empirical literature related to the three key variables included in the model: principal leadership, faculty trust and teacher professional learning.

Conceptual framework

Studies of school leadership effects have not only employed different conceptualizations of leadership, but also of the “distal variables” that leadership is proposed to impact in the school organization (Bossert et al., 1982; Bridges, 1982; Hallinger and Heck, 1998). Over the past 30 years, education reforms undertaken internationally have focused the attention of school practitioners squarely on student achievement as the distal variable of interest (Leithwood, 2001; Silva et al., 2011). Consequently, as reported by Hallinger and Heck (1998), researchers have concentrated their efforts on understanding the means by which principals achieve their impact on student learning.

Thus, research in this domain has increasingly focused on identifying and examining how leadership interacts with these mediating school and classroom level variables. Sometimes these studies also incorporate measures of student learning (e.g. Hallinger and Heck, 2010; Heck and Hallinger, 2010; Mulford and Silins, 2009). However, other useful studies have examined the influence of leadership on dependent variables that are themselves conceptualized as having a direct impact on student learning. Thus, researchers have examined leadership effects on student engagement with the school (Leithwood and Jantzi, 2000); school capacity for change (Krüger et al., 2007; Slegers et al., 2002; Spillane and Thompson, 1997; Thoonen et al., 2012); faculty trust (Hoy et al., 1992); teacher commitment to change (Geijsel et al., 2003); professional learning community (Li, Hallinger and Ko, in press; Lee et al., 2012), organizational learning (Mulford and Silins, 2009) and teacher effectiveness (Li, Hallinger and Ko, in press).

This body of research has directed the attention of leadership researchers towards conditions in the school that describe its capacity for change and improvement (e.g. Li, Hallinger and Ko, in press; Bossert et al., 1982; Bryk and Schneider, 2002, 2003; Louis et al., 2010; Mulford and Silins, 2009; Newmann et al., 2000; Robinson et al., 2008; Spillane and Thompson, 1997). One key facet of school capacity concerns the productive involvement of teachers in professional learning (Hattie, 2009; Leithwood et al., 2008, 2010a, 2010b; Louis et al., 2010; Mulford and Silins, 2003, 2009; Spillane and Thompson, 1997; Youngs and King, 2002). Indeed, a meta-analysis of leadership effects research in education concluded that principals’ support and involvement in teacher professional learning demonstrated the most robust path linking leadership and learning in schools (Robinson et al., 2008). In this study, we propose that trust acts as a mediator of principal leadership effects on the professional learning of teachers.

The conceptual framework proposed in this study is presented in Figure 1. Pitner (1988) noted that different paths comprising direct and indirect effect relationships may be employed in efforts to conceptualize and investigate school leadership effects (Baron and Kenny, 1986; Hallinger and Heck, 1998; Pitner, 1988; Scheerens, 2012). The presence of “direct leadership effects” implies that the “strength” of school leadership has a significant effect (of varying degrees) on various

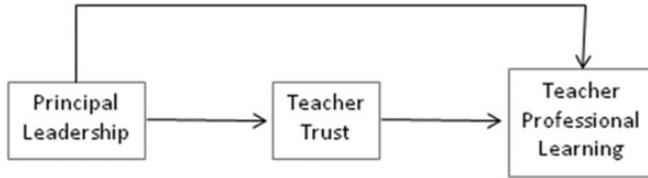


Figure 1. Conceptual model showing direct and mediating effects of trust on the relationship between principal leadership and teacher professional learning.

school conditions (e.g. faculty trust, teaching quality, or student learning). An “indirect leadership effect” implies that a selected portion (i.e. partial mediation) or all (i.e. full mediation) of the effect of leadership on the school condition operates through a third (or more) variable(s).

The need for accurate specification of the conceptual model has both theoretical and practical implications (Heck and Hallinger, 2010). From a theoretical perspective, explicit specification of the nature of the relationship among variables in the conceptual model is essential both for clarity of intellectual discourse and in order to carry out valid empirical investigations (Hallinger and Heck, 2011). In terms of policy and practice, accurate specification of the “nature” of leadership effects (i.e. indirect, direct, or both) is essential in order to direct practitioners towards the selection of strategies and “targets” that are most likely to have a high impact on desired student outcomes (see Kyriakides et al., 2009). This observation reflects a recurring debate in the literature on leadership for learning concerning the nature of the paths that link leadership, teaching and learning in schools (e.g. Hallinger and Heck, 2010, 2011; Bossert et al., 1982; Bridges, 1967; Erickson, 1979; Gross and Herriot, 1965; Hallinger and Heck, 1998; Leithwood et al., 2008, 2010a; Louis et al., 2010; Nettles and Herrington, 2007; Scheerens, 2012; Sebastian and Allensworth, 2012; Silva et al., 2011; Witziers et al., 2003).

Our proposed model suggests that principal leadership achieves its impact on teacher professional learning, in part, by building a climate of trust among teachers. As the arrows in Figure 1 indicate, both indirect and direct effects are proposed. Nonetheless, in this study, we test for both the possibility of a partial and full mediation model with respect to the impact of school leadership on trust and teacher professional learning (Preacher and Kelly, 2011).

Principal leadership

As noted above, research syntheses conducted over the past 15 years have produced conceptual models that are both more eclectic and comprehensive than in previous years. It is now widely accepted that conceptual models of school leadership must incorporate practices that focus on the “core technology” of teaching and learning (e.g. Hallinger and Murphy, 1985; Leithwood et al., 2008, 2010a; Robinson et al., 2008) as well as climate and capacity-building dimensions (e.g. Leithwood and Sun, 2012). Spillane, for example, articulated the perspective that principal leadership is focused on “activities tied to the core work of the organization” that are understood by school members “as intended to influence their motivation, knowledge, affect or practice” (Spillane, 2006: 11–12).

Day and colleagues (2009) extracted four common core practices of principal leadership from the literature on school leadership: setting direction; developing people; redesigning the organization; and managing the instructional teaching and learning program. These core leadership

practices were proposed to describe successful school leadership across a broad set of organizational contexts. This model has recently been employed in empirical research that partially validated this proposition (Leithwood et al., 2010b).

Walker and Ko (2011) proposed seven core areas of leadership practices, based in part on Leithwood's conceptual model, but adapted to reflect the "local Hong Kong institutional context." The seven dimension model included: strategic direction and policy environment; teaching; learning and curriculum; teacher growth and development; staff management and resource management; quality assurance and accountability; and external communication and connection. These core operational foci of principal practice provide a "convenient and manageable way of encapsulating school leadership" (Dimmock and Walker, 2002: 72). The current study in Hong Kong employed a composite measure of school leadership derived from the Walker and Ko (2011) model.

Faculty trust

Lewicki and Wiethoff defined trust as "an individual's belief in, and willingness to act on the words, actions and decisions of another" (2000: 87). Hoy and colleagues (2006) suggested that trust is "one's vulnerability to another in terms of the belief that the other will act in one's best interests" (429). Sebring and Bryk (2000) identified four "vital signs" for assessing trust in schools: respect, competence, personal regard, integrity. Walker and Ko proposed the following definition:

The extent to which one engages in a reciprocal relationship such that there is willingness to be vulnerable to and assume risk with the confidence that the other party will possess some resemblance of benevolence, competence, honesty, openness, reliability, respect, care, wisdom, and educational ideals. (2011: 472)

One's ability to trust others is based on three elements: one's belief system developed through life experience; social rules and norms; and one's experiences within a given relationship (Lewicki and Wiethoff, 2000). Indeed, it is commonly stated that trust is a relational feature that is "earned." Thus, trust may be given and may also be withdrawn.

The withdrawal of trust among followers can result in "distrust." Lewicki and colleagues (1998) defined distrust as "confident negative expectations regarding another's conduct" (439). Distrust is often contrasted with trust on opposite ends of a "trust continuum" (see McKnight and Chervany, 2001; Rotter, 1980; Worchel, 1979). Thus, distrust can be conceptualized in terms of the degree to which trust is present or absent in a relational set or social system.

Distrust may be focused on other individuals such as a leader, or upon sub-groups such as "the administration," social cliques or other departments (Deutsch, 1973; McKnight and Chervany, 2001; Mitchell, 1996; Rosenholtz, 1991). Although distrust carries with it a negative connotation, it can also be viewed as a functional response in a given organizational context. Distrust enables people to avoid the negative consequences of exploitation, manipulation, and other perceived risks. Although distrust can serve a functional short-term purpose at the interpersonal level, its effects can be pervasive and insidious at the organizational level by eroding the connective tissue necessary for the achievement of group goals (Lewicki and Wiethoff, 2000; Luhmann, 1979).

It is also useful to recognize that trust is an "alterable variable." Levels of trust can vary across sub-units of organizations, across different organizations, and at different points in time (Deutsch, 1973; Luhmann, 1979). Thus, trust and distrust tend to exist side by side in organizations. So even

when we talk about the presence of collective trust among members of an organization, it is not meant as a unitary descriptor of a stable organizational state.

Over the past 20 years, the role of collective trust in organizational change has achieved rising prominence in the school improvement literature. Cosner conceptualized trust as “a social resource that is an important element of school capacity” (2009: 250). Trust acts as a type of “connective tissue” that binds teachers together, supporting collaborative activities and movement towards collective goals (Bryk and Schneider, 2003: 44). Cosner (2009) found that trust enhances the “development of teachers’ knowledge, skills, and abilities that were necessary for reform enactment” and development of their classroom instruction (250). This emphasizes the notion of trust as an enabling social condition that operates in concert with other technical dimensions in efforts to bring about improvement in teaching and learning (Bryk and Schneider, 1996, 2002; Rosenholtz, 1991).

Research on leadership and school improvement also highlights the relationship between leadership and trust, in particular the role of principals in creating a condition of trust within a school’s faculty and community (Bryk and Schneider, 1996, 2002). This research tends to conceptualize as a socio-cultural condition that mediates the influence of leadership on the professional learning and development of teachers (e.g. Barth, 1990; Bryk and Schneider, 2002, 2003; Bryk et al., 1999; Hoy et al., 1992; Louis, 2007; Louis et al., 2010; Sergiovanni, 1990; Tschannen-Moran, 2000, 2004; Wahlstrom and Louis, 2008). For example, Tarter and colleagues (1995) asserted that “trust in the principal and trust in colleagues independently move the organization toward effectiveness” (47). Cosner claimed that cultivation of collegial trust is “a central feature of the capacity-building work” of the principals (2009: 257). Conversely, scholars have asserted that the lack of trust between school leaders and staff can represent an insurmountable obstacle to school improvement (Bryk and Schneider, 2003; Saphier and King, 1985).

In sum, we assert that trust represents a potentially important, alterable feature of school capacity. Trust represents as an “enabling condition” that facilitates the development of productive social relationships that underlie successful school improvement (Baier, 1986; Barth, 1990; Bryk and Schneider, 2002, 2003; Bryk et al., 1999; Hoy et al., 1992; Louis et al., 2010; Saphier and King, 1985; Slegers et al., 2002; Tschannen-Moran, 2000, 2004; Wahlstrom and Louis, 2008). This perspective on trust was employed in the current study, which sought to understand the role of trust as a mediator of principal efforts to facilitate teacher professional learning in primary schools.

Teacher professional learning

Teacher professional learning has been conceptualized in a variety of ways including staff development, peer coaching, professional learning communities, and communities of practice (Joyce and Showers, 2002; Little, 1993; Louis et al., 1994; Vescio et al., 2008). Wei et al. (2009) observed that teacher professional learning is “a product of both externally-provided and job-embedded activities that increase teachers’ knowledge and change their instructional practice in ways that support student learning” (1). Researchers assert that teacher professional learning should focus on deepening subject knowledge as well as pedagogical methods. Learning and support experiences should not be episodic and short-term but be continuous and sustained. Indeed, establishment of a “professional learning community” has been recommended as one means of facilitating continuous learning among teachers (Louis et al., 1994; Vescio et al., 2008). Moreover, teacher professional learning has been linked not only to school capacity to improve, but also to student outcomes (e.g. Hattie, 2009).

Development of these conditions in schools also appears to require support and involvement from the principal as well as middle level leaders (e.g. Hallinger and Heck, 2010; Hallinger and Murphy, 1985; Robinson et al., 2008). In the five dimensions of a successful teacher professional community, Hord (1997) values supportive and shared leadership from the principal the most. Principals are vital to encouraging the establishment of shared values and the missions of the schools among teachers. To ensure effectiveness of collective learning and application learning, a trusting and supportive school environment appears to be a fundamental precondition.

Liebman and colleagues (2005) highlighted five elements of teacher professional learning from the perspective of school improvement. The elements are shared norms and values, reflective dialogue, deprivatization practice, focus on student learning, and collaboration. In short, principals play an essential part in creating school conditions that enhance effective teacher professional learning. Louis et al. (2010) claimed that effective principal leadership strengthened teacher professional learning, and that in schools, teacher professional learning is “directly responsible for the learning of students” (37).

Method

This study employed an ad hoc quantitative survey design to examine the nature of the relationships among principal leadership, trust and teacher professional learning. In this section, we discuss the sample of schools and teacher respondents, the data collection instrument, and our approach to data analysis.

Sample

We invited primary schools from the larger school sponsoring bodies (i.e. local school authorities) in Hong Kong in 2011–2012. All respondents were assured of the confidentiality of their response and were informed that their participation was voluntary. Thirty-two schools agreed to participate. These represented 6% of Hong Kong’s primary schools. The low school participation rate is not atypical of school participation rates in Hong Kong when student achievement data is collected.¹ High inter-school competition for students makes school staff exceedingly wary of engaging in research that could place them at a competitive disadvantage. An analysis of the school profiles indicated that despite this being a convenience sample, the distribution was not biased in terms of location in Hong Kong, levels of teacher experience, or the socio-economic background of students.

In the study we gathered teacher data through an online survey. In total, 970 teachers from 32 schools responded to our survey questionnaire. The response rate was 72.5%.

Data collection

Two six-point survey scales were used for the research reported in this paper. The principal leadership scale was a modified version of Walker and Ko’s (2011) scale previously used for capturing key staff members’ perceptions of principal leadership in Hong Kong secondary schools. The seven dimensions consisted of strategic direction, teacher development leadership, staff management, external communication, resource management, quality management, and teaching and learning leadership. These were measured with 33 items. The six-point Likert scale included the following response options: (a) “not at all,” (b) “very little,” (c) “little,” (d) “partially,” (e) “a lot,” and (f) “very significantly.” For the current report, we employed a composite measure

derived by combining the 33 principal leadership items as well as an omnibus measure that drew upon results from the seven dimensions.

Having been used in Ko and Walker's recent study (2014), the principal leadership scale was validated using the default estimation method of Maximum Likelihood in Mplus Version 7. The scale shows reasonable model fit (minimum fit function chi-square (χ^2) = 1454.497, degrees of freedom (df) = 472, $p < 0.001$; root mean square error of approximation (RMSEA) = 0.046 with its 90% confidence interval as (0.044; 0.049), comparative fit index (CFI) = 0.957; Tucker Lewis index (TLI) = 0.952; standardized root mean square residual (RMR) = 0.032). Reliabilities (Cronbach's alpha) for the seven factors range from 0.914 to 0.960. These results indicate that the dimensions comprising the principal leadership scale met acceptable standards of internal consistency and validity.

The study also employed a scale designed to measure dimensions of school capacity. This scale was informed by Leithwood and Jantzi's (2000) and Walker and Ko's (2011) research. In this paper we report on sub-scales measuring trust and teacher professional learning. The former was conceptualized as a mediating construct and the latter was set as the distal variable in the tested models. The six response options were (a) "strongly disagree," (b) "disagree," (c) "somewhat disagree," (d) "somewhat agree," (e) "agree," and (f) "strongly agree."

The default estimation method of maximum likelihood in Mplus Version 7 was also used to validate measurement properties of this social capacity scale. After removing two ill-fitting items in the confirmatory factor analysis (CFA), a model of four latent variables with 19 of the 21 items was established. The fit statistics suggest good model fit (minimum fit function chi-square (χ^2) = 490.632, degrees of freedom (df) = 145, $p < 0.001$; RMSEA = 0.050 with its 90% confidence interval as (0.045; 0.054), CFI = 0.96; TLI = 0.953; RMR = 0.036). Cronbach's alpha coefficients for the four factors ranged between 0.817 and 0.932. Results of the validity and reliability tests suggest that the scales used for measuring dimensions of school capacity were strong.

Data analysis

As described earlier, our conceptual model posited the possibility of both direct and indirect principal leadership effects on teacher professional learning through trust. We employed Baron and Kenny's (1986) four-step hierarchical linear regression approach to causal mediation analysis to address our research question. This methodology is used to establish the nature of mediation in relationships among a set of variables.

Preacher and Hayes asserted that "a necessary component of mediation is a statistically and practically significant indirect effect" (2004: 717). This implies that assessment of the presence, strength and significance of possible indirect effects should be included as part of mediation analysis. However, Baron and Kenny's (1986) four-step mediation chain using hierarchical linear regression only enables the researcher to determine the presence and strength of the effects. Although regression analysis offers an indication of the significance of the beta coefficients, it does not assess the significance of the indirect effects.

Preacher and Hayes (2004) recommended the use of Sobel's (1982) test and bootstrapping (Hayes, 2013; Mooney and Duval, 1993) for the assessment of the statistical significance of indirect effects.² Bootstrapping yields ratios and sizes of the direct, indirect, and total effects for relevant paths in the tested model.³ This advance in analytical methodology strengthens Baron and Kenny's (1986) approach in which conclusions can be subject to Type 1 error (Preacher and Hayes,

2004). Moreover, the bootstrapping method enables a limited test of generalizability of the data to the full population of Hong Kong primary schools by randomly sampling the data 10,000 times (Hayes, 2013). Following this logic, we employed both Sobel's (1982) test and bootstrapping to assess the significance of indirect effects among the variables.

As noted in the previous sub-section, the main analyses conducted for this study employed the composite score obtained for the principal leadership scale. In order to further verify the findings, however, we complemented this analysis with the use of an "omnibus test" of the mediation relationships using the seven dimensions structure of the principal leadership scale. According to Hayes, an omnibus test is:

... used to answer the question as whether there is evidence that variable or variable(s) *X* exerts an effect on *Y* without specifying which variable in the set of *X* variables is responsible for the effect or, in the case of a multi-categorical *X*, the nature of the difference between group means that is responsible for that effect. (2013: 1)

In brief, it is an overall or a global test of the effects of several possible predictors on a dependent variable without specifying which predictor is significantly different from the other(s). In our omnibus test, the seven dimensions comprising principal leadership were used as independent variables to predict teacher professional learning via trust.

Results

Descriptive statistics obtained for the key variables were as follows. The composite measure of principal leadership has a mean of 3.72 (SD = 0.94) on the six-point scale. The mean score for trust was 4.91 (SD = 0.71) and for teacher professional learning it was 4.47 (SD = 0.73). The reader is reminded that these statistics were generated from scales that used different response categories and are not, therefore, directly comparable.

Results of the stepwise regression analyses are reported in Table 1. The first analyses sought to determine if principal leadership was a significant predictor of teacher professional learning. Teacher professional learning was regressed on the composite measure of principal leadership. As displayed in Table 1, principal leadership demonstrated a direct effect on teacher professional learning ($\beta = 0.274, p < .001$) and accounted for 7.51% of the total variance of teacher professional learning.

In the second step, we sought to understand the relationship between principal leadership and trust. When trust was regressed on principal leadership, we found a direct effect ($\beta = 0.137, p < .001$) between the two variables. We note, however, that principal leadership only contributed a relatively small portion (1.88%) of the total variance of trust (see also Table 1).

In the third step, we examined the relationship between trust and teacher professional learning. When teacher professional learning was regressed on trust, a direct effect was again detected ($\beta = 0.658, p < .001$). Moreover, trust explained a much more substantial proportion (43%) of the total variance in levels of teacher professional learning (see Table 1).

In step four, we examined the effect of principal leadership on teacher professional learning after controlling for the effect of trust. In this analysis trust was entered in the first block in the hierarchical regression and principal leadership second. As shown in Table 2, principal leadership remained a significant predictor of teacher professional learning, although the absolute size of its standardized regression coefficient weakened slightly (i.e. from .274 to .188, $p < .001$). After

Table 1. Regression of teacher professional learning on principal leadership through trust (N = 970).

Step	Dependent variable/independent variables	Coefficients			Significance level	LLCI	ULCI
		B	Standard error	t			
Step 1 (total effect)	Dependent variable: teacher professional learning						
	Principal leadership	.213	.024	8.881	.000	.166	.260
R = .275, R ² = .075, F(1, 968) = 78.871, P = .000							
Step 2	Dependent variable: trust						
	Principal leadership	.104	.024	4.313	.000	.057	.151
R = .137, R ² = .019, F(1, 968) = 18.603, P = .000							
Step 3	Dependent variable: teacher professional learning						
	Trust	.648	.024	26.655	.000	.600	.696
R = .658, R ² = .433, F(1, 968) = 737.396, P = .000							
Step 4 (direct effect)	Dependent variable: teacher professional learning						
	Principal leadership	.146	.018	7.920	.000	.110	.182
R = .683, R ² = .467, adjusted R ² = .466, F(2 967) = 423.574, P = .000							

controlling for trust, principal leadership explained 6.1% of the variance in teacher professional learning. In this regression analysis trust continued to explain 42.4% of the total variance in teacher professional learning. This pattern of results suggests that trust is very likely a mediator of the relationship between principal leadership and teacher professional learning.

Up to this point, the series of regression models followed Baron and Kenny's (1986) procedures for determining the nature of mediated relationships. However, as indicated earlier, sole reliance on regression leaves the significance of the mediated relationships open to question. Therefore, we employed additional tests on the statistical significance of the relationships.

The direct effect of principal leadership on teacher professional learning, after controlling for trust, is .146. This is a substantial decrease from the total effect .203 (see Figure 2). As shown in Figure 3, the indirect effect of principal leadership (.067) on teacher professional learning is the product of the direct effect of principal leadership on trust (.104) and the direct effect of trust on teacher professional learning (.648).

In this analysis, if the indirect effect of principal leadership on teacher professional learning through trust is significant, the mediating effect of trust is supported. As shown in Table 2, when trust is controlled for in the single mediation model, the indirect effect of principal leadership on teacher professional learning was statistically significant.⁴ Bootstrapping was also employed in order to assess the strength of these findings. This procedure yielded a very similar (.067) and statistically significant indirect effect. Thus, we conclude that the indirect effect of principal leadership on teacher professional learning through trust is significant.

Table 2. The Sobel test and bootstrapping results for indirect effects of trust on the relationship between principal leadership and teacher professional learning.

Bootstrap results for indirect effects	Indirect effects of independent variable on dependent variable through mediators				Bias corrected and accelerated confidence intervals		Bias corrected confidence intervals		Percentile confidence intervals	
	Data	Boot	Bias	SE	Lower	Upper	Lower	Upper	Lower	Upper
Trust	.067	.067	-.000	.021	.029	.110	.028	.109	.028	.108
Effect size indices for indirect effects					Effect	Boot SE	Boot LLCI	Boot ULCI		
Ratio of indirect to total effect					.316	.075	.153	.453		
Ratio of indirect to direct effect					.462	.161	.181	.827		
R-squared mediation effect size					.041	.016	.013	.076		
Preacher and Kelley (2011) kappa-squared proportion					.099	.030	.039	.157		

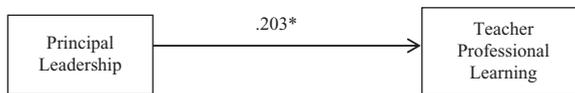


Figure 2. The total effect model showing the effect of principal leadership on teacher professional learning.

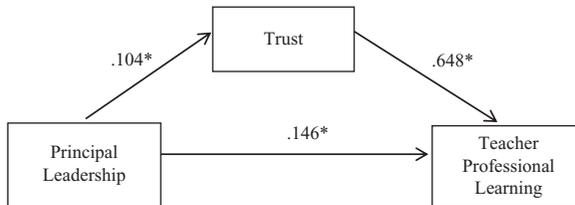


Figure 3. The single mediation model showing effects of principal leadership on teacher professional learning through trust.

Table 2 shows the effect size of the mediator trust, the proportion of the indirect effect in contrast with the total effect and direct effect, and the statistical significance of the mediation and proportions. The indirect effect of principal leadership on teacher professional learning constitutes a significant 31.6% of its total effect on teacher professional learning. In other words, approximately 31.6% of the total effect of principal leadership on teacher professional learning is mediated by trust.

Further, the indirect effect is 46.2% of the direct effect of principal leadership on teacher professional learning. The R^2 mediation effect size and Preacher and Kelley’s (2011) kappa-squared proportion⁶, both reported only for simple mediation analysis, again indicate that the mediated effects are small (.041 and .099 respectively) in size but statistically significant.⁵ By resampling randomly 10,000 times, the bootstrap confidence intervals ensure correct inference of the indirect

effects. These findings from the Sobel and bootstrapping tests were very consistent with the regression results. They indicate that the indirect effect of principal leadership on teacher professional learning through trust is statistically significant. Therefore, we conclude that trust is a mediator in the relationship of principal leadership and teacher professional learning.

Omnibus tests using the seven dimension structure of the principal leadership scale also affirmed a small but significant mediating effect of trust on teacher professional learning (effect = .020, SE = .011). Results of the omnibus tests for the direct effect ($R^2 = .057$, $F(7,961) = 15.166$, $p < .001$) and total effect ($R^2 = .126$, $F(7,962) = 19.867$, $p < .001$), also indicate small but statistically significant direct effects and total effects of principal leadership practices on teacher professional learning.

Discussion

Efforts to understand the relationship between leadership and learning have engaged the attention of scholars, policymakers and practitioners for the past half-century (Bossert et al., 1982; Bridges, 1967; Erickson, 1979; Gross and Herriot, 1965; Hallinger and Heck, 1998; Hallinger and Murphy, 1985; Leithwood et al., 2008; Robinson et al., 2008). This is due both to the theoretical richness and practical implications of this relationship. Indeed, we note that in each of six different international educational leadership and management journals the most highly cited paper is concerned with this topic.⁷ The current study focused on understanding the role of faculty trust as a potential mediator of leadership effects on teacher learning. We found that principal leadership had both direct and indirect effects, through faculty trust, on teacher professional learning. In this section of the paper we review limitations of the study, offer our interpretation of these findings, and discuss their implications.

Limitations

This study is subject to four notable limitations. First, although the sample size of schools and teachers was adequate to conduct the selected statistical analyses, the school sample was not randomly selected from the population of Hong Kong primary schools. This limits our ability to generalize the results beyond the sample. In order to compensate for this limitation, we verified that the sample was representative of the population of Hong Kong primary schools on several key criteria (e.g. student socioeconomic status (SES), location, school size, teacher experience). We also employed bootstrapping in order to strengthen the test of significance of effects. Although these steps still do not allow for generalizability, they do increase our confidence that the results are indicative of leadership practice in Hong Kong primary schools.

Second, this study focused on identifying the mediating effects of one facet of school capacity: faculty trust. In fact, multiple features of school capacity contribute to teacher professional learning (see Heck and Hallinger, 2009; Louis et al., 1994; Mulford and Silins, 2003). While we believe that our selection of variables is defensible, our data analysis is subject to the effects of other "omitted variables." Future research should examine the mediating effects of trust in concert with other relevant capacity factors.

Third, this study conceptualized and measured trust as a unitary construct. Nonetheless, as noted earlier, we acknowledge other conceptualizations that differentiate trust and distrust (e.g. Lewicki et al., 1998). An analytical approach that is capable of assessing the differentiated impact of trust and distrust could also contribute to an enriched understanding of these relationships.

Interpretation of the findings

Mediated-effects models of leadership for learning presume that the main impact of school leadership is achieved not through the direct interaction of the principal with students but rather by the leader's efforts at shaping the school culture and structure, and facilitating teacher effectiveness (Li, Hallinger and Ko, in press; Hallinger and Heck, 1998, 2010; Leithwood et al., 2008; Marks and Printy, 2003; Mulford and Silins, 2003; Printy et al., 2009; Robinson et al., 2008; Sebastian and Allensworth, 2012). As leaders of learning, principals play a key role as "catalysts for change" (Hallinger, 2003; Bryk and Schneider, 2003; Hall and Hord, 2002; Slegers et al., 2002; Spillane and Thompson, 1997) and "enablers" of teacher development (Barth, 1990; Hallinger and Murphy, 1985; Newmann et al., 2000; Robinson et al., 2008). This study affirms prior research conducted in western societies that has identified trust as mediator between principal efforts to foster teacher learning and development and extends the finding to a very different socio-cultural context.

In interpreting this finding, we wish to note that schools are characterized by several unique contextual and organizational features that shape both requirements for leadership and relationships between principals and teachers. First, limitations on salary compensation raise the importance of stimulating and sustaining the intrinsic motivation of teachers (Bossert et al., 1982). Second, teachers work largely in isolation, thereby requiring considerable creativity and persistence by leaders to develop collaborative cultures capable of innovation and change (Barth, 1990; Rosenholtz, 1991; Saphier and King, 1985). Third, schools operate in an increasingly demanding accountability-oriented environment in which principals and teachers are closely monitored for the extent to which they translate system-level goals and initiatives into school-level practices (Leithwood, 2001). This is very clearly the case in Hong Kong, where system policies implemented have both intensified and routinized the task environment of teachers, increasing stress (Cheng and Walker, 2008).

In the Hong Kong education environment the tentacles of externally imposed accountability systems increasingly intrude into the daily routines of classroom teachers. As leaders of learning, Hong Kong principals must play a delicate role in balancing system administrators' expectations for efficiency and results with teachers' needs for a satisfying professional work environment (see Li, Hallinger and Ko, in press; Cuban, 1988; Geijsel et al., 2003; Slegers et al., 2002; Walker and Ko, 2011; Yu et al., 2002). Helping teachers to find and sustain meaning and purpose in their work represents a key challenge for principal leadership in this context (Donaldson, 2001; Lee et al., 2012; Leithwood, 2001; Spillane et al., 2007; Walker and Ko, 2011; Yu et al., 2002). We suggest that trust is an essential ingredient to sustaining teacher commitment to change and engaging teachers in collaboration and professional learning (Bryk and Schneider, 2002, 2003; Louis, 2007; Tarter et al., 1995; Tschannen-Moran, 2004).

The findings of this study are also consistent with the literature on teacher collaboration. Establishing collective trust has featured as a key intermediate goal in continuing efforts to foster teacher workplace collaboration and the development of professional learning communities (e.g. Louis, 2007; Rosenholtz, 1991). At the same time, scholars have noted that efforts at building trust can be undermined by "contrived collegiality" (Hargreaves, 1992). This scenario unfolds when the values espoused by leaders are not backed up by "tangible support" (see Saphier and King, 1985).

The theorized linkages between principal leadership, trust and teacher learning that were affirmed empirically in this paper find further support in commentaries on leadership practice (see Barth, 1990; Cuban, 1988; Saphier and King, 1985). Most school administrators will concur that

faculty trust is a commodity which is only gained over a period of time through persistent effort. It can be easily lost even through unintentional missteps, thus turning into distrust or even active resentment and resistance. Once lost, it is more difficult to regain (Bryk and Schneider, 2003; Kut-syuruba et al., 2011; Tschannen-Moran, 2004).

The dynamics of faculty trust become even more complex during times of change, when there is a natural predisposition to hold on to the safety of the known (Hall and Hord, 2002). In Hong Kong, for example, “over competition from marketization” and “close control from accountability measures” have put front-line teachers under huge pressure (Cheng, 2009: 75; Cheng and Walker, 2008). The negative effects of the intensification of education reforms has become evident not only in low morale and wavering commitment, but also in mental health issues ranging from mood disorders resulting from mild depression through to suicide (Cheng, 2009).

In this context, teachers are increasingly suspicious of new education initiatives and reforms (Cheng and Walker, 2008). Thus, principals find it increasingly difficult to galvanize teachers to respond to education reforms and make changes. In Hong Kong this problem became so endemic that in 2012, the incoming Education Secretary declared a short-term moratorium on the adoption of new reforms. In this context, principals’ attempts to implement system initiatives at the school level can engender distrust if not handled with care. While this dynamic is by no means unique to Hong Kong (see Cuban, 1988; Leithwood, 2001; Wildy and Loudon, 2000), the intensification of reforms in Hong Kong has made sustaining the trust and commitment of teachers more difficult for Hong Kong’s principals.

Implications

We wish to highlight several implications for theory, research and practice. In terms of theory, the findings affirm a developing trend among scholars that seeks to incorporate both relational (e.g. trust) and technical (e.g. teacher learning) dimensions into models of leadership and learning (Hallinger, 2003; Day et al., 2009; Leithwood and Sun, 2012; Leithwood et al., 2008; Louis et al., 2010; Walker and Ko, 2011). Future research should incorporate multi-dimensional measures of school capacity both to address the problem of omitted variables and to examine the interaction of different leadership and capacity dimensions in achieving effects on teacher and student learning.

We note that the current study focused on teacher professional learning as the distal dependent variable rather than student learning. We acknowledge that testing comprehensive multi-level models focused on student learning outcomes holds greater weight in policy-oriented leadership research (e.g. see Hallinger and Heck, 2011; Heck and Hallinger, 2009; Mulford and Silins, 2009; Robinson et al., 2008; Thoonen et al., 2012; Witziers et al., 2003). However, we also believe that there remains a place for research that focuses more narrowly on key relationships that are posited within the broader conceptual models that seek to describe leadership effects on learning (e.g. Bossert et al., 1982; Hallinger and Heck, 1998; Leithwood et al., 2008; Pitner, 1988).

By reducing the complexity of the conceptual model, we are able to carry out more focused testing of relationships. By way of example, this study employed a particularly disciplined and rigorous approach to verifying the presence, strength and significance of the “trust pathway” between principal leadership and teacher learning (Hayes and Preacher, 2010). We view this as a useful approach for other studies that posit a similar objective to unpack “key paths” that link leadership and learning. Moreover, we assert that this approach is preferable when high quality achievement data are either unavailable or difficult to obtain.⁸

Finally, we wish to emphasize that our findings affirm that trust acts as a potentially powerful enabler of teacher learning and “sustainable” change (Bryk and Schneider, 2002, 2003; Louis, 2007; Saphier and King, 1985; Tschannen-Moran, 2004). Therefore, we suggest that trust represents a useful intermediate target for principal action. In practical terms we can suggest three ways by which principals develop school climates characterized by trust and motivation among teachers for continued learning.

Even in the context of bureaucratic systems and strategic initiatives, principals must engage with teachers on a human level, demonstrating personal interest, sincerity and caring. We manage budgets, schedules, and facilities, but we lead people. As March (1978) observed, educational administration is writing bus schedules with footnotes from Kierkegaard. Or as Barth (1990) asserted, motivating the professional commitment of teachers must go beyond raising student achievement on standardized tests. The human dimension of leading people requires some level of trust if we hope to bring about sustainable change (Hallinger, 2003; Leithwood et al., 2008).

Trust is predicated upon others believing what we say, and also that we will follow through on our commitments. This points towards “modeling” as a key leadership practice (Barth, 1990; Bass, 1985; Leithwood and Sun, 2012). Modeling entails articulating one’s values and expectations verbally, and then following through on them in practice. Does the leader “walk the talk?” Does the leader provide tangible support for the vision espoused with teachers (Saphier and King, 1985)?

Finally, trust must be built on a foundation of certainty that one can depend upon even in the midst of change. One means of providing a sense of certainty or stability during times of change is through articulating and building a longer-term shared vision of change for the school (Hallinger and Lee, 2014; Barth, 1990). Working within a shared vision offers teachers the possibility of finding sustained meaning in their work (Hallinger, 2003; Donaldson, 2001). We note that our definition of “shared vision” is not synonymous with a set of measurable goals, but rather emphasizes the underlying purposes of education for student growth (see Barth, 1990; Kantabutra, 2005). Nor does it refer solely to a vision or mission statement. Rather, the vision must be visible in the life of the school and in the practice of leaders and teachers.

Appendix A. Survey items measuring principal leadership

To what extent do you believe that your principal’s leadership practice and actions have changed in relation to the following: (over the past three years in your school or the time he/she has spent in the school if less than three years)

Strategic management

1. Help clarify the reasons for our school’s improvement initiatives.
2. Give staff a sense of the overall purpose of the school.
3. Provide assistance to staff in setting goals for teaching and learning.
4. Integrate school priorities with the government policy agenda.

Teacher development leadership

1. Help train the school management team.
2. Develop leaders amongst the teachers.
3. Promote a range of continuous professional development experiences for all staff.
4. Use coaching and mentoring to improve quality of teaching.

5. Encourage staff to think of learning beyond the academic curriculum.
6. Align staff professional development activities with school development.

Staff management

1. Assign work to staff in accordance with their capabilities.
2. Show appreciation for teachers' outstanding performance.
3. Provide timely performance feedback to teachers.
4. Handle grievances amongst teachers.
5. Improve the performance appraisal system.

Resource management

1. Maintain cooperative relationship with parents.
2. Engage parents in the school's improvement effort.
3. Develop strategies to promote the school to the community.
4. Establish a professional network with educational communities.

External communication

1. Allocate resources strategically based on student needs.
2. Demonstrate an ability to secure additional resources for the school.
3. Utilize support (auxiliary) staff for the benefit of student learning.
4. Provide or locate resources to help staff improve their teaching.

Quality management

1. Establish a structured quality assurance mechanism in school.
2. Create a culture of accountability among teachers.
3. After observing classroom activities, work with teachers to improve their teaching.
4. Use student assessment data to inform school strategic planning.
5. Regularly observe classroom activities.
6. Regularly inspect student homework.

Instructional leadership

1. Initiate school-based instructional projects.
2. Encourage staff to consider new ideas for their teaching.
3. Design measures to improve student learning.
4. Articulate high expectations for student academic achievement.

Appendix B. Survey items measuring teacher perceptions of school capacity

Indicate the extent to which you agree that each statement characterizes your school

Trust.

1. We handle our work with competence and confidence.
2. We approach our work professionally.
3. We do not try to gain an advantage by deceiving others.
4. We can freely discuss our feelings, worries, and frustrations.

Teacher professional learning.

1. We provide and receive support from our colleagues to accomplish tasks.
2. Teachers in our school regularly discuss possible ways to improve student performance.
3. Teachers are encouraged to develop and implement new practices.
4. We share our best practices with other colleagues.
5. There is ongoing collaboration among teachers in the same subject panel.
6. We can accomplish more through working in small teams.
7. There is ongoing collaboration among teachers in different subject panels.
8. The school timetable provides adequate time for collaborative teacher planning.

Abbreviations

1. LLCI: lower level confidence interval.
2. ULCI: upper level confidence interval.
3. Data: the indirect effect calculated in the original sample.
4. Boot: the mean of the indirect effect estimates calculated across all bootstrap samples.
5. Bias: the difference between “Data” and “Boot.”
6. SE: the standard deviation of the bootstrap estimates of the indirect effect.

Acknowledgment

The authors wish to thank Rebecca Li and Bowie Liu for their assistance in data collection.

Notes

1. Although we did collect student achievement data, these were not employed for the current study.
2. The differences are that step 4 only reports the regression weights and variance explained, and decides whether the proposed mediator works as a full mediator, a partial one or not at all. The significance test via bootstrapping reports all of the effects (indirect, direct, and total), and visualizes them. The effects should be identical with the unstandardized regression weights, if the bootstrapping method is not used. So here the boots' means are meant for generalization to the population.
3. The bootstrapping method uses a resampling method to create random samples each time from the original sample and computes the mean of indirect effect from all the replacement samples, hence the higher accuracy for inference. It does not follow the assumptions of large sample size; nor do normal and symmetrical distribution of indirect effects.
4. We note that Sobel's test assumes that there is a normal distribution of the indirect effect (effect = .067, SE = .016). The Shapiro–Wilk test of normality further supports this indication of the significance of the indirect effects ($Z = 4.260$, $P = .000$).
5. In addition to the significant t -ratios, we also note that the pair of confidence intervals does not include 0. This further verifies the significance of the effect sizes.
6. Kappa-squared indicates the proportion of the maximum possible indirect effect of a predictor variable on an outcome variable. Preacher and Kelley (2011) use the notation kappa-squared to denote that like the squared multiple correlation coefficient, it (a) cannot be negative, (b) is bounded (inclusively) between 0 and 1, and (c) represents the proportion of the value of a quantity to the maximum value it could have been. Otherwise, and the population squared multiple correlation coefficient have generally different properties.

7. This assertion is based on an analysis conducted in March 2014 using Harzing's Publish or Perish tool. We refer to *Educational Administration Quarterly*; *Journal of Educational Administration*; *School Leadership and Management*; *Educational Management, Administration and Leadership*; *Leadership and Policy in Schools*.
8. The author, Hallinger's own recent review of studies of leadership effects on student achievement found that the difficulty in obtaining high quality student achievement data has often led researchers towards compromises that emasculate the final results of these studies. For example, researchers have frequently used average grade level scores as measures of school-level effectiveness, thereby removing most of the within-school variability in student learning outcomes. Alternatively, the research often fails to control for student SES, the strongest predictor of student learning. The use of poor quality achievement data (i.e. for the purposes of this line of research) then leads to weak or ambiguous results (Hallinger and Heck, 1998).

Funding

This study was supported in part by funding support from the Research Grant Council of Hong Kong through the General Research Fund Project # 840509.

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