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Principal leadership and school capacity effects on teacher learning in Hong Kong

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Abstract

Purpose – Over the past decade, studies of school leadership effects have increasingly aimed at identifying and validating the paths through which principal leadership impacts key teaching and learning processes in schools. A recent meta-analysis by Robinson and colleagues identified principal practices that shape teacher professional development experiences in schools as the highest impact path used by instructional leaders. The purpose of this paper is to examine relationships between principal leadership, dimensions of school capacity, and teacher professional learning in 32 Hong Kong primary schools.

Design/methodology/approach – The study employed a cross-sectional research design and quantitative methods to analyze teacher perceptions of principal leadership and key school conditions. The research employed hierarchical linear regression analysis to explore survey data collected from a sample of 970 teachers. The surveys covered a range of principal leadership and school capacity dimensions, as well as a measure of teacher professional learning.

Findings – Results indicated that multiple dimensions of principal leadership made significant contributions to both school capacity and teacher professional learning. The presence of cooperation, trust, communication, support for students, and alignment, coherence, and structure in schools also affected teacher professional learning.

Research limitations/implications – These findings contribute to the global discourse on leadership for learning. The study addresses the need established by multiple scholars (e.g. Leithwood, Hallinger, Heck, Robinson, Witziers) for research that further illuminates "paths" and "intermediate targets" through which leadership impacts teaching and learning. The findings elaborate on the means by which leadership can enhance school capacities that directly impact teacher classroom practice and student learning. Consistent with other scholarly research (e.g. Bryk and Schneider, Louis and colleagues, Sahphier and King) the findings also point toward the importance of establishing selected workplace conditions (e.g. trust, cooperation, communication) as a foundation for fostering teacher professional learning.

Practical implications – The study reinforces the finding from other studies that it is productive for principals to foster an environment aimed at enhancing teacher professionalism. The study also highlights the potentially dysfunctional consequences that can arise from competing system-level initiatives aimed at increasing monitoring and teacher accountability and fostering teacher professionalism.

Originality/value – The study contributes to a small but growing body of leadership effects research conducted in non-Western societies. As such the study offers insights with relevance for understanding leadership processes in other Asian and non-Western cultures.

Keywords Leadership, Principal, School capacity, Teacher learning

Paper type Research paper

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Leithwood and colleagues asserted that research conducted over the past several decades yields the conclusion that principal leadership is "second only to classroom instruction among all school-related factors that contribute to what students learn at school" (Leithwood *et al.*, 2006, p. 17). At the same time, however, scholars have tempered this conclusion by observing that leadership effects on student learning are "mediated" by other school conditions that directly impact student achievement (Hallinger and Heck, 1998, 2010; Kleine-Kracht, 1993; Louis *et al.*, 2010; Witziers *et al.*, 2003). These findings have encouraged scholars to examine the "paths" (Bossert *et al.*, 1982; Day *et al.*, 2009; Hallinger and Heck, 1998; Leithwood *et al.*, 2010b; Sammons *et al.*, 2009; Supovitz and Turner, 2000; Witziers *et al.*, 2003) or "intermediate targets" (Creemers and Kyriakides, 2008; Kyriakides *et al.*, 2009) through which leadership impacts learning.

These "paths" typically incorporate school- and classroom-level constructs that directly impact student learning (Hallinger and Heck, 2010; Heck and Hallinger, 2009, 2014; Kyriakides *et al.*, 2009; Leithwood *et al.*, 2010b). King and Newmann (2001), for example, asserted that student achievement was affected most directly by the "quality of teacher instruction," which in turn is shaped by "school capacity" and "teacher professional learning." Hallinger and Heck (2010) found that measures of a primary school's "capacity for academic improvement" predicted change in its student achievement outcomes over time. Youngs and King (2002) claimed that principals' "beliefs and actions regarding teacher professional development" were associated with the improvement of staff capacity to impact student learning (p. 644).

Although the knowledge base underlying conceptualizations of leadership and learning relies primarily upon research studies conducted in Western societal contexts, related findings have had an observable impact on education policy throughout the world (e.g. Day *et al.*, 2009; MacBeath and Cheng, 2008). This is, for example, the case in East Asia where policy makers have, over the past decade, implemented a wide range of measures aimed at supporting and monitoring principal efforts to enhance the quality of teaching and student learning in schools (e.g. Hallinger and Lee, 2013; Pan and Chen, 2011; Walker *et al.*, 2012). Yet, despite this policy trend, empirical research examining the nature and impact of these efforts in East Asia remains in its nascent stages (e.g. see Hallinger and Bryant, 2013).

The current study addressed this gap by exploring the relationship between principal leadership, school capacity, and teacher professional learning in Hong Kong primary schools. The study employed a quantitative analysis of cross-sectional data collected from 970 teachers in 32 Hong Kong primary schools. The study extends the predominately Western empirical literature on educational leadership by elaborating on one path through which leadership contributes to learning in schools (Belchetz and Leithwood, 2007; Leithwood *et al.*, 2010b).

Theoretical perspective

In this section of the paper, we present the conceptual model that guided this inquiry into leadership and teacher professional learning in Hong Kong primary schools. This is followed by discussion of the key variables included in the study.

Conceptual framework

The model presented in Figure 1 shows the paths through which we propose that principal leadership impacts teaching and learning. The model first suggests that principal leadership operates by directly impacting school capacity (see Hallinger and Heck, 2010; Heck and Hallinger, 2009, 2014; Leithwood *et al.*, 2006, 2010b). The model

suggests that leadership practices of the principal may exert both indirect and direct effects on teacher professional learning (i.e. through school capacity). This is an example of what Preacher (2011) has termed a partial mediation process. The unshaded portions of the model (i.e. change in teacher practice and student learning) are not in this report (see also Heck and Hallinger, 2014).

The label "change in teacher practice" suggests that this model is dynamic (see Heck and Hallinger, 1999, 2009, 2014). That is, leadership is proposed as a catalyst for change in teacher practice. Ideally, the full model would be tested through longitudinal analysis capable of illuminating patterns of change over time among the relevant school conditions (see Hallinger and Heck, 2010; Heck and Hallinger, 2009, 2014; Thoonen *et al.*, 2012).

In the current report, we focus on left hand side of the model represented by the shaded boxes. More specifically, we examine how leadership impacts school capacity directly, and teacher professional learning both directly and indirectly. In the remainder of this section, we discuss the variables that comprised the focus of this study.

Principal leadership

Leithwood and Riehl (2003, p. 5) asserted that, "a core set of leadership practices form the basics of successful leadership and are valuable in almost all educational contexts." Belchetz and Leithwood (2007) qualified this assertion by noting this core set of leadership practices must be adapted to the needs, constraints and opportunities of different socio-cultural and organizational contexts. State-of-the-art scholarship in educational leadership is engaged in testing and elaborating on the boundaries of these assertions (Day *et al.*, 2009; Hallinger and Heck, 2010; Heck and Hallinger, 2009, 2014; Hallinger and Lee, 2013; Leithwood *et al.*, 2008, 2010a, b; Marks and Printy, 2003; Opdenakker and Van Damme, 2007; Printy *et al.*, 2009; Scheerens, 2012; Sebastian and Allensworth, 2012; Thoonen *et al.*, 2012).

In this study, we employed a multi-dimensional model of principal leadership earlier proposed by Walker and Ko (2011) in their study of Hong Kong secondary school principals. Their conceptualization was, in turn, inspired by a leadership model developed by Leithwood *et al.* (2006). However, we adapted the Leithwood model to reflect "local priorities" that had been established by Hong Kong's Education Department (ED) in their framework for school leadership development (Education Department (ED), 2002). As shown in Figure 2, the seven dimensions of the model tested in this study included instructional leadership, strategic management, teacher development leadership, staff management, external communication, resource management, and quality management.

Instructional leadership has engaged the focus of scholars in educational leadership for the past 50 years (e.g. see Bossert *et al.*, 1982; Bridges, 1967; Hallinger and Heck, 1998; Hallinger and Murphy, 1985; Robinson, 2011). The most commonly applied model of instructional leadership was developed by Hallinger and Murphy (1985). They posited three dimensions encompassing defining a school mission, managing curriculum and

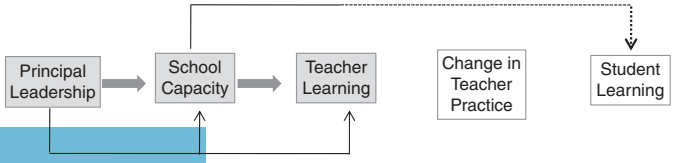

Figure 1.
Conceptual model of school leadership effects

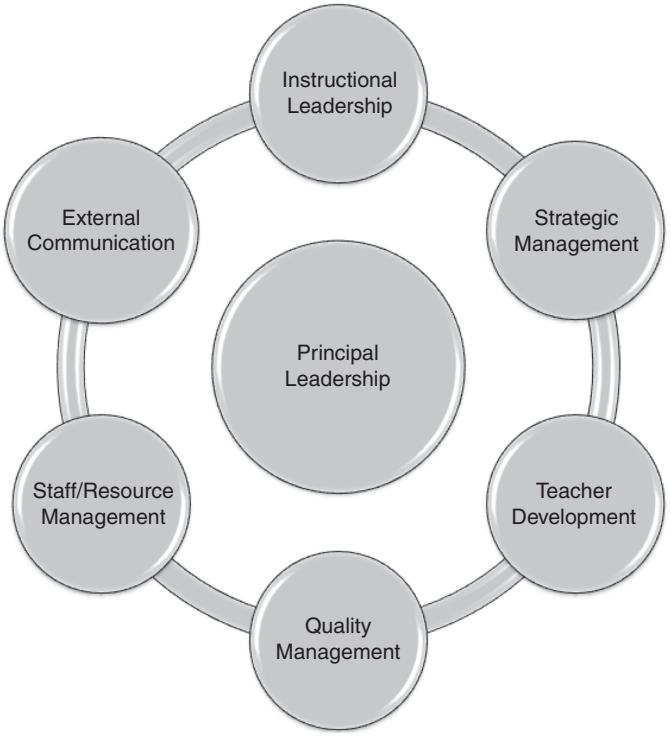

Figure 2.
Dimensions of principal leadership

instruction, and developing a positive school learning climate. The model of principal leadership used in this study incorporates aspects of these dimensions across several sub scales of the measurement instrument. In sum, our instructional leadership dimension centers on practices of the principal that shape teaching and learning expectations and priorities in the school (see Appendix 1 for items).

Policy reforms aimed at building more robust accountability structures in school systems (see Leithwood, 2001; Walker and Ko, 2011) have made "strategic management" an imperative for school principals (Davies *et al.*, 2005). Strategic management is aimed at ensuring that goals and policies directed from the school's external environment are closely aligned with programs and practices enacted inside the school. In our model, the strategic management dimension focusses on practices that seek to align system goals, school-level priorities, and staff activities.

As noted earlier, teacher development has been conceptualized and validated as a key path through which principals impact teaching and learning processes in schools (Leithwood *et al.*, 2008; Robinson, 2011). In this study, teacher development leadership was conceptualized as processes and activities that promote coaching, mentoring and continuous support for the learning of teachers, encourage quality of teaching and learning, and provide opportunities for self-development. The activities could be formal or informal and could take place inside or outside of schools.

The principal's role in "boundary spanning" (Goldring and Pasternak, 1994) has long been acknowledged as key to building and sustaining support for the school. Principals who fail to maintain robust communication channels to their external

environments run the risk of losing political and resource support for their efforts inside the school (Cuban, 1988; Leithwood *et al.*, 2010a, b; Leithwood and Riehl, 2003). Therefore, our leadership model incorporates an external communication dimension comprised of activities designed to gain and maintain support from parents and other key external stakeholders.

Another global education reform trend that has gathered pace over the past decade has been the use of "quality management tools" in education. This includes the use of a wider range of rewards and incentives, as well as more systematic application of teacher evaluation for school improvement (Leithwood, 2001; Hallinger *et al.*, 2014; Murphy *et al.*, 2013). We included a staff management dimension that focusses on principal practices that are intended to motivate teachers and enhance their competence.

Principals also have a major impact on how school resources are obtained and managed (Bossert *et al.*, 1982; Cuban, 1988). Research suggests that school leaders have different capacities for gaining access to resources, channeling them toward school priorities, and employing them with efficiency and fairness (e.g. see Bossert *et al.*, 1982; Chiu and Walker, 2007). In our model, resource management highlights practices concerned with obtaining and using resources to directly benefit teaching and learning.

In Hong Kong, a demanding and pervasive system of school-level accountability has reshaped principal practice over the past decade (Walker and Ko, 2011). Quality management and accountability requirements and related monitoring systems increasingly shape the priorities and daily practice of school principals. This has increased pressure on principals to take a more hands-on role in managing classroom processes, and to employ standardized procedures in monitoring teaching and learning processes. We therefore included a quality management dimension to reflect these "facts of life" in leading schools in Hong Kong.

School capacity

The capacity of schools to improve has been the subject of theorizing as well as empirical investigation. Though defined differently by various scholars, "school capacity" is conceived as a school-level construct. Cosner (2009) proposed that school capacity is reflected in "a collection of organizational resources, interactive in nature, that supports school wide reform work, teacher change, and ultimately the improvement of student learning" (p. 250). Newmann *et al.* (2000) asserted that a school's capacity to improve student achievement included the knowledge, skills, and dispositions of individual teachers, the strength of the school's professional community, the extent to which the programs are coherent, the nature of the principal's leadership, and the quality of its technical resources. They further suggested that a schools' capacity can be improved through the use of systematic teacher professional development.

Malen and Rice (2004) conceptualized school capacity as a two-dimensional construct, "that directs attention to the nature of a school's resource base and the productivity of those resources" (p. 632). In addition to the availability of resources, they emphasized "the ability of a school to translate resources into expected outcomes" (Malen and Rice, 2004, p. 635). They also highlighted the potentially important role of 'resource alignment. This was defined as the "degree of correspondence between the resources that are available and the resources that are required to accomplish organizational goals" (Malen and Rice, 2004, p. 636).

Heck and Hallinger (2009, 2014; Hallinger and Heck, 2010) undertook a series of studies of leadership, school capacity, and school improvement. Their studies defined

school capacity as a school condition comprised of multiple features such as communication, trust, quality of student support, sustained focus on improvement, and teacher professional capacity (e.g. see Heck and Hallinger, 2009). Their research confirmed a "direct relationship" between measures of school leadership and school capacity, as well as between school capacity and growth in student learning.

Teacher professional learning

As noted at the outset of this paper, research has proposed that principals play a key role in building capacity through teacher professional development (Youngs and King, 2002). Guskey (2000) defined professional development as the "processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (p. 16). Teacher growth and development was included in the Principals' Continuing Professional Development Framework set by the ED of Hong Kong as one of the seven core dimensions. The perspective on the principal's role in this domain was conveyed as follows:

> Principals promote and enable continuing professional and career development for teachers and themselves. They foster the sharing of up-to-date professional knowledge and informed practice aimed at accommodating the diverse needs of students within a general commitment to school improvement and student achievement (p. 5).

Principals have the responsibility to organize and support the professional development of their teachers. There is increasing evidence that teacher learning can result in improved instruction and, subsequently, student achievement (Hadar and Brody, 2010; Louis *et al.*, 1994; O'Connor, 2004; Pancucci, 2008; Vescio *et al.*, 2008). Thus, principal leadership for teacher professional development is increasingly regarded as "an essential mechanism for deepening teachers' content knowledge and developing their teaching practices" (Desimone *et al.*, 2006, p. 181).

In sum, leadership for learning encompasses not only the learning of students, but also of teachers. Continued on-the-job professional learning is a fundamental means of enabling teachers to adapt to changing needs and to improve instructional skills. Principals play a key role in this domain by shaping a school environment that motivates and supports the ongoing learning of school staff (Darling-Hammond, 1999; Falk, 2001; Robinson, 2011; Supovitz and Turner, 2000).

Method

This study employed a quantitative cross-sectional survey design to investigate the conceptual model presented in the previous section. In this section, we present the methods used in this study. We discuss the school and participant sample, as well as methods of data collection and data analysis.

School sample

The school sample for this study was a voluntary sample drawn from the population of 600 plus Hong Kong primary schools. We invited primary schools from Hong Kong's larger school sponsoring bodies (i.e. local school authorities) to participate in the study. All respondents were assured of the confidentiality of their responses and were informed that their participation was voluntary. Principals were told that the objective of the survey was to advise school management practice. In total, 32 schools agreed to participate. These represented 6 percent of Hong Kong's primary schools.

The participating schools were representative in terms of location by Hong Kong's education districts. Given that school location by district is a proxy indicator of school socio-economic status (SES) in Hong Kong, it can be said that our data had a reasonably good representativeness of SES. Indeed, the average of the median household incomes of school districts in our data was HKD$20,943 per month, which was almost equal to the average of the 18 districts' median income of HKD$20,500 per month in 2011 (Population Census Office, 2011).

The data also indicated a good representativeness in terms of the type of school (i.e. private schools and public schools including government, aided, and direct subsidy scheme schools). The proportions of school types in our data were similar as those of school types in the entire schools[1]. In sum, although the selection of schools was not based on random sampling, characteristics of the school sample indicate a reasonable degree of representation on two of the most important school characteristics in Hong Kong.

Instruments

In this study two questionnaires were used together to survey teachers' perceptions of their principal's leadership practices and school capacity. As claimed, the conceptualization of principal leadership practices can be best drawn from teachers' perceptions, because "the whole idea of educational leadership is based on the influence of principals on teachers" (van de Grift and Houtveen, 1999, p. 374).

The principal leadership questionnaire was adapted from Walker and Ko's (2011) scale measuring the work of principals in Hong Kong secondary schools. After removing items that were not applicable to primary schools, the number of items was reduced to 33, covering seven dimensions of leadership practice: strategic management, teacher professional development, staff management, resource management, external communication, quality management, and instructional leadership. Each dimension was measured by a set of four to six items. A six-point Likert scale (i.e. not at all, very little, little, partially, a lot, very significantly) aimed to capture how teachers perceived principal leadership practices.

The survey scales used to measure school capacity were based on Leithwood and Jantzi's (2000) scale surveying organizational conditions: trust, communication, teacher professional learning, alignment, workload, resource capacity, and support for students. dimensions for cooperation, and organizational commitment adapted from scales developed by Alper *et al.* (1998) were added as well.

The capacity dimensions were measured by a total of 38 items. The number of items in these dimensions varied from three to eight. The Likert-type questions also had six response options (namely, strongly disagree, disagree, somewhat disagree, somewhat agree, agree, and strongly agree). The school capacity items are shown in Appendix 2.

Although both scales were had been previously established (e.g. Walker and Ko, 2011), a confirmatory factor analysis was conducted to assess the scale's key measurement properties. We employed the default estimation method of maximum likelihood in LISREL 8.8. With 33 items measuring seven dimensions of principal practices, the principal leadership scale showed satisfactory model fit (minimum fit function $\chi^2 = 2{,}842.05$, degrees of freedom (df) = 474, $p = 0.0$; root mean square error of approximation (RMSEA) = 0.075 with its 90 percent confidence interval as (0.072; 0.077), comparative fit index (CFI) = 1.00; relative fit index (RFI) = 0.97; standardized root mean square residual (RMR) = 0.032; critical $n = 250.61$). Reliabilities based on Cronbach's α ranged from 0.914 to 0.960 for the seven factors. These results suggested that the factors comprising the leadership scale met acceptable standards of internal consistency and validity.

A CFA model comprised of nine latent variables was established for the organizational capacity scale. The fit statistics suggested reasonable model fit (Minimum Fit Function $\chi^2 = 4{,}226.76$, df = 704, $p = 0.0$; RMSEA = 0.078 with its 90 percent confidence interval as (0.076; 0.080), CFI = 0.97; RFI = 0.97; standardized RMR = 0.086; critical $n = 183.08$). Cronbach's α coefficients for the nine dimensions ranged from 0.718 to 0.932. These results suggest that the scales used for measuring school capacity were strong.

Data collection

An online platform was set up to enable easy access by teachers to the survey instrument. Data were collected with the Chinese version of the survey scales. Although both English and Chinese are official languages in Hong Kong, Chinese is the *de facto* medium of communication in local primary schools. In total, 394 school management team members and 559 teachers from 32 schools responded to our survey questionnaire: the response rates were 78 and 72.5 percent, respectively.

Data analysis

The data were analyzed using a variety of statistical methods. At the basic level, descriptive statistics were used to illuminate general trends. As noted above, confirmatory factor analysis was used to assess the measurement constructs embedded in the instrument. Subsequently, hierarchical multiple regression analysis was employed to address the research goal of unpacking the relationship among leadership, school capacity and teacher professional learning constructs.

Results

The study sought to explore how dimensions of leadership and school capacity were related to reported levels of teacher professional learning in our sample of 32 Hong Kong primary schools. In general, the capacity dimensions evidenced higher mean scores and smaller standard deviations than those for principal leadership (see Table I). The exception to this trend was the construct, teacher workload, for which the relatively lower mean score reflects a negative perspective among teachers toward this construct (i.e. high workload).

Table II displays Pearson correlation coefficients for the seven leadership dimensions and the nine school capacity dimensions. All dimensions for principal practices were highly correlated with coefficients ranging from 0.726 to 0.894. This finding is not, however, unusual in leadership scales where the dimensional constructs share commonality (see Goldring *et al.*, 2009; Hallinger *et al.*, 2013). For example, we earlier noted that items often associated with instructional leadership in some models were allocated to other dimensions of the instrument used in this study (e.g. strategic management, teacher development leadership, quality management). Thus, the more differentiated nature of the seven dimension model could explain the high inter-correlations in the sub-scales of the leadership instrument, all of which were aimed at "leadership for learning."

In contrast, correlations among the various dimensions of school capacity varied more substantially. Coefficients ranged from 0.091 to 0.759. We note in particular, the low and mostly significant correlations between resource capacity and workload and other school capacity dimensions. Ko *et al.* (2012) obtained a similar result in their study of Hong Kong secondary schools and drew the conclusion that these two school

Dimensions	Mean	SD
Principal leadership		
Strategic management	3.79	0.97
Teacher development leadership	3.78	1.03
Staff management	3.62	1.01
External communication	3.69	1.07
Resource management	3.74	1.05
Quality management	3.66	1.00
Instructional leadership	3.76	1.04
School capacity		
Trust	4.68	0.71
Communication	3.96	1.00
Alignment, coherence, and structure	4.39	0.80
Resource capacity	3.83	1.02
Workload	3.01	1.02
Support for students	4.53	0.72
Cooperation	4.46	0.76
Organizational commitment	4.49	0.096
Teacher professional learning	4.47	0.73

Table I.
Descriptive statistics for the dimensions of principal leadership and school capacity

capacity dimensions were "qualitatively different from other school conditions that were more closely correlated" (p. 225).

Correlations across dimensions of the principal leadership and school capacity scales were generally low but significant. The correlations between teacher professional learning and dimensions of the two scales showed a stark contrast. teacher professional learning was correlated moderately to strongly with most of the school capacity dimensions (see Table I). The highest correlations with were teacher professional learning were evidenced with cooperation (0.761), alignment (0.754), and trust (0.736).

Teacher professional learning evidenced low correlations both with the composite score of principal leadership (0.274), as well its more specific dimensions (i.e. 0.146-0.313). In contrast, teacher professional learning evidenced a much higher correlation with the composite score of school capacity (0.786). The contrasting results imply that, the school capacity constructs may have a more direct relationship with teacher learning than principal leadership. This possibility was further explored in subsequent inferential analyses.

The dimension teacher professional learning was singled out as the dependent variable in subsequent regression analyses. Table III shows the regression results for principal leadership and teacher professional learning. The dimensions comprising principal leadership were used as independent variables and followed the hierarchical structure according to their relevance to school improvement. Entered into the first block, strategic management and quality management turned out to be both significant predictors of teacher professional learning, jointly explaining over 5 percent of the total variance. However, quality management, which contributed 4.99 percent of the total variance on its own, was no longer significant in the second step.

On the other hand, the predictive power of strategic management increased to 2.73 percent, and still impacted teacher professional learning, though in a negative direction. Its negative influence increased slightly in the third step to a high of 2.78 percent. The explanatory power of instructional leadership, while statistically significant, was still quite low, decreasing further from 0.92 to 0.72 percent. The

Factor/scale	Strategic man	Teach dev	Staff man	External comm	Resource manage	Quality manage	Instructional leadership	Trust	Communication	Align	Resource capacity	Workload	Support for students	Cooperation	Org commitw	Teacher learning	Prin lead	School cap
Strategic man	1																	
Teacher dev	0.844**	1																
Staff man	0.726**	0.810**	1															
External comm	0.741**	0.779**	0.837**	1														
Resource man	0.750**	0.808**	0.851**	0.887**	1													
Quality man	0.775**	0.817**	0.819**	0.846**	0.860**	1												
Instruct lead	0.774**	0.807**	0.781**	0.822**	0.849**	0.894**	1											
Trust	0.084**	0.166**	0.262**	0.196**	0.219**	0.180**	0.165**	1										
Communication	0.141**	0.243**	0.336**	0.281**	0.292**	0.244**	0.241**	0.589**	1									
Alignment	0.172**	0.265**	0.352**	0.316**	0.322**	0.288**	0.279**	0.659**	0.752**	1								
Resource cap	−0.135**	−0.107**	−0.092**	−0.111**	−0.072*	−0.155**	−0.099**	0.103**	0.048	0.091**	1							
Workload	0.126**	0.184**	0.277**	0.205**	0.190**	0.171**	0.143**	0.254**	0.536**	0.434**	−0.202**	1						
Support students	0.105**	0.190**	0.271**	0.238**	0.266**	0.220**	0.203**	0.642**	0.607**	0.756**	0.091**	0.300**	1					
Cooperation	0.145**	0.231**	0.321**	0.262**	0.275**	0.257**	0.254**	0.684**	0.621**	0.746**	0.119**	0.350**	0.759**	1				
Organizational commitment	0.118**	0.180**	0.276**	0.194**	0.227**	0.180**	0.185**	0.618**	0.589**	0.628**	0.235**	0.252**	0.565**	0.612**	1			
Teacher learning	0.146**	0.247**	0.313**	0.264**	0.268**	0.253**	0.265**	0.736**	0.657**	0.754**	0.065*	0.334**	0.710**	0.761**	0.584**	1		
Principal lead	0.872**	0.914**	0.908**	0.923**	0.937**	0.937**	0.924**	0.199**	0.278**	0.312**	−0.120**	0.202**	0.234**	0.273**	0.213**	0.274**	1	
School capacity	0.129**	0.233**	0.347**	0.271**	0.296**	0.235**	0.234**	0.771**	0.837**	0.874**	0.284**	0.532**	0.800**	0.835**	0.790**	0.785**	0.273**	1

Notes: $n = 970$. *,**Significant at 0.05 and 0.01 levels, respectively (two tailed)

Table II.
Bivariate correlations for the dimensions of the principal leadership and school capacity

Table III.
Hierarchical multiple regression of principal leadership dimensions on teacher professional learning

Step	Dependent variable/ independent variables	Unstandardized coefficients *B*	SE	Standardized coefficients *β*	Sig. level	Percentage of variance explained
Dependent variable: teacher professional learning						
Step 1	Strategic management	−0.094	0.037	−0.125	0.011	0.67
	Quality management	0.255	0.036	0.350	0.000	4.99
	$R^2 = 0.070$***, adjusted $R^2 = 0.068$, R change = 0.070 ($p = 0.000$); F (2,967) = 36.471***					
Step 2	Strategic management	−0.234	0.045	−0.312	0.000	2.73
	Teacher develop Lead	0.191	0.046	0.271	0.000	1.72
	Instructional leadership	0.151	0.050	0.216	0.003	0.92
	$R^2 = 0.099$***, adjusted $R^2 = 0.095$, R change = 0.029 ($p = 0.000$); F(4,965) = 26.480***					
Step 3	Strategic management	−0.233	0.044	−0.310	0.000	2.78
	Teacher develop Lead	0.099	0.049	0.141	0.042	0.43
	Instructional leadership	0.132	0.050	0.188	0.008	0.72
	Staff management	0.230	0.042	0.319	0.000	3.01
	$R^2 = 0.126$***, adjusted $R^2 = 0.122$, R change = 0.027 ($p = 0.000$); F (5,964) = 27.805***					

Notes: $n = 970$. ***Significant at 0.001 level (two tailed)

explanatory power of teacher development leadership fell from 1.72 to 0.72 percent. The other two block-three dimensions, resource management and external communication were not significant predictors. staff management emerged as the most powerful predictor affecting teacher professional learning explaining 3.01 percent of the total variance.

As shown in Step 3, the four significant predictors explained 8 percent of the total variance. Notably, strategic management continued to contribute negatively to teacher professional learning. The coefficient of teacher development leadership showed modest significance at the 0.05 level. The R^2 increased to 0.126, from 0.099 in the prior step. The R^2 change in the final step was significant at the 0.01 level.

Table IV shows the results of the stepwise multiple regression of school capacity dimensions on teacher professional learning. When the school capacity dimensions were entered into the linear regression model stepwise, cooperation was significant in predicting teacher professional learning, though the portion of variance explained dropped from 57.85 percent to a much lower level of 7.16 percent. A similar pattern ensued with respect to trust, which explained 20.69 percent of the variance in Step 2, but decreased to 11.99 percent in Step 5. Alignment explained a significant 4.13 percent of the total variance on its own, substantially exceeding that of communication and support for students. Five of the school capacity dimensions yielded significant beta weights in predicting teacher professional learning. Their effects were uniformly positive, and all coefficients were significant at the 0.01 level. The R^2 reached a high of 0.713.

These findings related to the impact of school capacity dimensions contrast with the quite modest explanatory power of principal leadership in fostering teacher professional learning. The combined effect of the school capacity factors was several times stronger than principal leadership in predicting teacher professional learning.

Table V shows the hierarchical multiple regression results when the model included principal leadership, school capacity and teacher professional learning. When the principal leadership dimensions were entered alone as the first block in the regression model, the same four significant predictors continued to show significant regression coefficients. Likewise the dimension strategic management continued to exert a negative influence.

Step	Dependent variable/ independent variables	Unstandardized coefficients *B*	SE	Standardized coefficients *β*	Sig. level	Percentage of variance explained
Dependent variable: teacher professional learning						
Step 1	Cooperation	0.726	0.020	0.761	0.000	57.85
	$R^2 = 0.578$, adjusted $R^2 = 0.578$, R change = 0.578 ($p = 0.000$); $F(1, 968) = 1{,}328.418$***					
Step 2	Cooperation	0.462	0.024	0.484	0.000	27.12
	Trust	0.413	0.026	0.405	0.000	20.69
	$R^2 = 0.666$, adjusted $R^2 = 0.665$, R change = 0.087 ($p = 0.000$); $F(2, 967) = 962.740$***					
Step 3	Cooperation	0.295	0.027	0.309	0.000	10.89
	Trust	0.323	0.026	0.317	0.000	14.13
	Alignment	0.287	0.025	0.315	0.000	11.93
	$R^2 = 0.706$, adjusted $R^2 = 0.705$, R change = 0.040 ($p = 0.000$); $F(3, 966) = 771.633$***					
Step 4	Cooperation	0.288	0.027	0.301	0.000	10.52
	Trust	0.309	0.026	0.303	0.000	12.97
	Alignment	0.233	0.029	0.256	0.000	6.27
	Communication	0.072	0.020	0.099	0.000	1.38
	$R^2 = 0.710$, adjusted $R^2 = 0.708$, R change = 0.004 ($p = 0.000$); $F(4, 965) = 589.563$***					
Step 5	Cooperation	0.250	0.029	0.262	0.000	7.16
	Trust	0.297	0.026	0.291	0.000	11.99
	Alignment	0.197	0.031	0.217	0.000	4.13
	Communication	0.071	0.019	0.098	0.000	1.37
	Support for students	0.103	0.030	0.102	0.001	1.19
	$R^2 = 0.713$, adjusted $R^2 = 0.712$, R change = 0.003 ($p = 0.001$); $F(5, 964) = 479.185$***					

Notes: $n = 970$. ***Significant at 0.001 level (two tailed)

Table IV.
Regression of school capacity dimensions on teacher professional learning

Step	Dependent variable/ independent variables	Unstandardized coefficients *B*	SE	Standardized coefficients *β*	Sig. level	Percentage of variance explained
Dependent variable: teacher professional learning						
Step 1	Strategic management	−0.235	0.045	−0.313	0.000	2.80
	Teacher develop lead	0.100	0.049	0.142	0.041	0.44
	Staff management	0.224	0.047	0.311	0.000	2.26
	Instructional leadership	0.130	0.052	0.185	0.013	0.65
	$R^2 = 0.126$, adjusted $R^2 = 0.12$, R change = 0.126 ($p = 0.000$); $F(7, 962) = 19.866$***					
Step 2	Teacher develop lead	0.064	0.028	0.091	0.022	0.55
	Resource management	−0.087	0.032	−0.125	0.006	0.78
	Instructional leadership	0.107	0.030	0.153	0.000	1.35
	Trust	0.304	0.027	0.298	0.000	11.96
	Communication	0.075	0.021	0.102	0.000	1.28
	Alignment	0.194	0.031	0.213	0.000	3.95
	Support for students	0.114	0.030	0.113	0.000	1.48
	Cooperation	0.242	0.029	0.253	0.000	6.59
	$R^2 = 0.722$, adjusted $R^2 = 0.717$, R change = 0.595 ($p = 0.000$); $F(15, 954) = 24.776$***					

Notes: $n = 970$. ***Significant at 0.001 level (two tailed)

Table V.
Regression of principal leadership and school capacity dimensions on teacher professional learning

When the school capacity dimensions were introduced into the regression as a group in Step 2, the strongest principal leadership predictors strategic management and staff management were replaced by the moderate predictor resource management, which functioned in a negative direction. The dimension instructional leadership turned out to be most powerful principal-level predictor, followed by teacher development leadership.

With respect to school capacity, trust, and cooperation consistently made the largest independent contributions to explaining variations in perceived levels of teacher professional learning. This suggests that these school capacity dimensions each contributed uniquely and in combination with the other factors in explaining levels of teacher professional learning. It should be noted that, the most powerful predictors (i.e. trust, communication, cooperation) were all related to human resources and the workplace environment of schools.

Discussion

In this section of the paper, we begin by reviewing limitations of the study. Then we summarize and interpret the main findings. Finally, we discuss implications of the study for research and practice.

Limitations

This study was subject to several limitations. First, this study adopted a cross-sectional, quantitative survey design. This research design does not allow us to draw causal inferences, only identify the strength of associations among the variables studied. Thus, our conclusions must be interpreted with caution and in light of the larger body of work in this domain.

The study examined a relatively small sample of Hong Kong's primary schools. Although we did not uncover important sources of bias in the convenience sample, the results again must be interpreted as preliminary even with respect to generalizing to "all Hong Kong primary schools." Future research in the Hong Kong context will continue to build on these results.

Finally the quantitative design does not give a good feel for the actual practices used to enact leadership in these in the schools. Qualitative investigation would enable a richer description of the patterns of practice uncovered in this study. Thus, mixed methods or follow-up qualitative analysis would be useful in elaborating on these results.

Interpretation of the findings

The findings from this study elaborate on previous international findings with respect to the relationship between principal leadership and learning in schools. Our study found that the impact of principal leadership on teacher learning is mediated by alterable conditions that exist within schools. More specifically, we found that the "direct effects" of principal leadership on teacher professional learning were less substantial than mediated effects operating through school capacity. Moreover, the "total effects of leadership" on teacher professional learning increased slightly when the independent effects of leadership and school capacity were considered jointly. Thus, we consider the relationship between principal leadership and teacher professional learning as "partially mediated" (Preacher, 2011).

These broad results reinforce the image of principals achieving results by shaping conditions that impact both teacher and student learning (see also Robinson, 2011). As various scholars have asserted (e.g. Bossert *et al.*, 1982; Hallinger and Heck, 1998;

Heck and Hallinger, 2009, 2014; Leithwood *et al.*, 2008, 2010b; Mulford, 2007), principal effects appear to accumulate through creating a school climate that motivates the learning of teachers and students (Barth, 1990; Newmann *et al.*, 2000; Saphier and King, 1985). This finding represents an incremental advance in our understanding of the paths that connect leadership and learning in schools.

We further note that the current study extends findings from previous studies of leadership and learning conducted in local secondary schools. For example, Walker and Ko (2011) identified a negative effect of principals' strategic management on school conditions and student learning outcomes. Similar to current study, they defined strategic management as the principal's efforts to align school practices with system direction and initiatives. The current study found that stronger strategic management was not associated with perceptions of enhanced teacher professional learning. Another study based on the primary school data set came to a similar conclusion with respect to the effects of strategic management on teacher commitment (Hallinger *et al.*, in press). These findings from separate studies call attention to the potentially dysfunctional consequences of system-level efforts to stimulate teacher professionalism through the use of top-down education quality and accountability tools (Ko *et al.*, 2012; Walker and Ko, 2011).

The study also examined the relative impact of different leadership approaches among primary school principals. When only principal leadership was considered, principals' "staff management" practices showed strongest leadership effects on teacher professional learning. In Hong Kong, the role of principals has intensified in recent years as increased responsibility for school outcomes has been accompanied by increased market-oriented and system-level accountability. As the agent between policy makers and teachers, they must introduce and lead education reforms and report to the authorities periodically, even as they manage resistance from teachers. Our data suggest that the principals' efforts to manage the tensions between system-level strategic initiatives and teacher professional engagement may not be bearing the desired results.

Consistent with other research that has examined the effects of leadership on student learning (e.g. Robinson, 2011), instructional leadership showed the most robust effects of the different leadership constructs on teacher professional learning. It is interesting to note that resource management followed instructional leadership as the next most significant contributor to teacher professional learning. Upon reflection this should not be so surprising, since resource allocation is critical to finding the time and money to create and sustain teacher opportunities for learning on the job. Nonetheless, we have not seen this feature emphasized in the principal leadership literature.

As noted above, school capacity had a significantly larger direct effect on teacher professional learning than principal leadership. Selected school capacity factors (e.g. alignment, communication, trust, cooperation) showed robust independent and combined effects on the strength of teacher perceptions of teacher professional learning in the schools.

The school-level factors exerted much larger influence on teacher professional learning. Among the nine dimensions, trust was evidenced to have most significant relationship with teacher professional learning in schools, followed by teacher cooperation. As defined by Hoy *et al.* (2006, p. 429), trust is "one's vulnerability to another in terms of the belief that the other will act in one's best interests" (Hoy and Tschannen-Moran, 2003). In this study trust was defined as "the interdependence of the relationships of the members" and especially "the emotional bond between the principal

and teachers" (Caskey, 2010, p. 2). We suggest that trust may function as a precondition for developing a professional learning community that in turn fosters teacher leadership and learning (Bryk and Schneider, 2003; Hargreaves, 2007; Louis *et al.*, 2010; Mulford, 2007; Tschannen-Moran, 2009; Tarter *et al.*, 1989). This also carries over to broader efforts at school improvement (Bryk and Schneider, 2002, 2003; Fullan, 2001; Tschannen-Moran, 2000).

Implications

This study focussed on the effects of principal leadership. Nonetheless, it is also worth noting that leadership effects on teacher learning should also emerge from other sources in the school. In the Hong Kong context, this would include members of the school management team, vice principals, a formally designated curriculum leader, as well as panel heads and teachers more generally. Thus it is possible that the rather modest effects of principal leadership observed in this study could potentially be "compounded" by including the effects of these other sources of leadership. These observations lead to the suggestion that researchers should design leadership effects studies so as to be able to examine and differentiate leadership from principals and other sources of leadership (Day and Leithwood, 2007; Day *et al.*, 2009; Heck and Hallinger, 2009).

The study was conceptualized to contribute to our understanding of how leadership shapes school capacity as a vehicle for school improvement (Barth, 1990; Hargreaves and Fullan, 1998; Leithwood *et al.*, 2008, 2010a, b; Sleegers *et al.*, 2002). The pattern of "partially mediated leadership effects" on teacher learning through school capacity reinforces the conclusion that principals should aim their leadership efforts toward "evidence-based intermediate targets" in order to enhance teacher and student learning in schools (Creemers and Kyriakides, 2008; Heck and Hallinger, 2009, 2014; Kyriakides *et al.*, 2009; Leithwood *et al.*, 2008, 2010a, b; Robinson, 2011; Witziers *et al.*, 2003). This contrasts, for example, with alternate views that have proposed that principals should seek to "directly influence" student achievement results (Nettles and Herrington, 2007; Silva *et al.*, 2011).

Interpreting the same finding from a more practical perspective, the results offer insights into how dimensions of school capacity interact to influence teacher learning. More specifically, we noted the influence of selected "relational dimensions" of school capacity that build social capital in schools (Rosenholtz, 1991; Saphier and King, 1985). This contrasts, for example, with "quality management" strategies such as intensification of teacher evaluation that emphasize control and "reduction of error" (e.g. Hallinger *et al.*, 2014; Hazi and Arredondo-Rucinski, 2009; Reynolds *et al.*, 2003; Stiggins and Duke, 1988).

Indeed, the negative results mentioned above with respect to strategic management warrant additional consideration. Historically, Hong Kong operated with a highly decentralized system in which largely independent "school sponsoring bodies" were funded by the Government's ED to provide education services under a relatively loosely coupled authority system. When compared with systems in many other nations, the central government exercised relatively little control over the school sponsoring bodies. An unstated goal embedded within the Hong Kong government's formulation and implementation of school-based management has been to gain greater control over the management of schools and, more specifically, principals.

The somewhat counter-intuitive finding concerning the negative impact of principals' efforts at "strategic management" could suggest that Hong Kong's principals are finding it difficult to "make sense" of and achieve effective "alignment" among the plethora

of system-level initiatives they are expected to support and implement (Cheng and Walker, 2008). Thus, even as some system initiatives have trumpeted the need for professional learning communities, others have intensified processes aimed at increasing teacher and principal accountability (Hallinger *et al.*, in press; Ko *et al.*, 2012; Walker and Ko, 2011). Cuban's (1988) analysis of the imperative whereby principals must satisfy system-level expectations while maintaining the support of teachers appears potentially relevant to understanding this emergent situation.

As Hord (1997) pointed out, principal leadership is fundamental to building a successful school-based learning community. Respect, equality, and openness between the principal, other leaders and teachers are important for the development of a school culture that supports the motivation and enactment of teacher learning (Barth, 1990; Louis, 2007; Robinson, 2011; Saphier and King, 1985). Our findings support the belief that principal leadership contributes meaningfully to the enhancement of processes that foster teacher professional learning. Nonetheless, they also highlight the complexities that unfold as principals seek to create school environments that are characterized by trust, effective two-way communication and structured collaborative process within the context of imposed accountability structures.

Note

1. Specifically, here are the comparisons of the school types between our data and the entire schools: Aided (88 percent of our data vs 82 percent of the entire schools), Government (3 percent of our data vs 7 percent of the entire schools), DSS (3 percent in our data vs 4 percent in the entire schools), and Private (6 percent of our data vs 7 percent of the entire schools). We wish to note that due to the issue of data accessibility we used the 2013 primary school profile data while our data collection was completed in 2012 for these comparisons. However, we do not think that there was a dramatic change of school type during the period between 2012 and 2013.

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Appendix 1. Questionnaire items teacher perceptions of 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

5. Help train the school management team.
6. Develop leaders amongst the teachers.
7. Promote a range of continuous professional development experiences for all staff.
8. Use coaching and mentoring to improve quality of teaching.
9. Encourage staff to think of learning beyond the academic curriculum.
10. Align staff professional development activities with school development.

Staff Management

11. Assign work to staff in accordance with their capabilities.
12. Show appreciation for teachers' outstanding performance.
13. Provide timely performance feedback to teachers.
14. Handle grievances amongst teachers.
15. Improve the performance appraisal system.

Resource Management

16. Maintain cooperative relationship with parents.
17. Engage parents in the school's improvement effort.
18. Develop strategies to promote the school to the community.
19. Establish a professional network with educational communities.

External Communication

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

Quality Management

24. Establish a structured quality assurance mechanism in school.
25. Create a culture of accountability among teachers.
26. After observing classroom activities, work with teachers to improve their teaching.
27. Use student assessment data to inform school strategic planning.
28. Regularly observe classroom activities.
29. Regularly inspect student homework.

Instructional Leadership

30. Initiate school-based instructional projects.
31. Encourage staff to consider new ideas for their teaching.
32. Design measures to improve student learning.
33. Articulate high expectations for student academic achievement.

Appendix 2. Questionnaire 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.

Communication

5. Meetings in our school are effective and efficient.
6. There is a reasonable number of meetings in our school.
7. We have timely information to complete our jobs.
8. The principal always keeps colleagues informed about new school.

Alignment

9. Our strategies are formulated around our school purpose.
10. Our annual school plan aligns with our school vision.
11. Our school protects teachers from external disturbances to their teaching.

12. We know the priorities that our school wants to achieve.
13. Our school tries to nurture a positive learning environment.

Workload

14. Different subject teams compete with one another for resources.
15. Different subject teams compete with one another on performance.
16. Our school's structure is more complicated than other schools.
17. Our school structure constrains effective implementation of new initiatives

Resource Capacity

18. Teachers' workload in this school is quite fair compared with teachers in other schools.
19. The amount of administrative work required of teachers in this school is not excessive.
20. We have clear division of labor in our school.

Support for Students

21. The atmosphere throughout our school encourages students to learn.
22. Our school provides after school academic support activities for students.
23. Teachers have access to the teaching resources that they need to do a good job.
24. Our school provides a broad range of extracurricular activities for students.

Cooperation

25. I would be very happy to spend the rest of my career with this organization.
26. I really feel as if this organization's problems are my own.
27. I do not feel like "part of the family" at my organization.
28. I do not feel "emotionally attached" to this organization.
29. This organization has a great deal of personal meaning for me.
30. I do not feel a strong sense of belonging to my organization.

Teacher Professional Learning

31. We provide and receive support from our colleagues to accomplish tasks.
32. Teachers in our school regularly discuss about possible ways to improve student performance.
33. Teachers are encouraged to develop and implement new practices.
34. We share our best practices with other colleagues.
35. There is ongoing collaboration among teachers in the same subject panel.
36. We can accomplish more through working in small teams.
37. There is ongoing collaboration among teachers in different subject panels.
38. The school timetable provides adequate time for collaborative teacher planning.

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