Collaboration as a Mediator in the Relationship between Principal Leadership and Teacher Professional Learning: The Hong Kong Experience [1][2][3]

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This study tested how collaboration, as a component of school capacity and a potential mediator, affect the relationship between principal leadership and teacher professional learning in Hong Kong primary schools. To investigate teacher perceptions of principal leadership and school capacity, two questionnaires were combined to use. The online survey was administered with a sample of 970 teachers from 32 local primary schools. The orthodox regression based four-step causal approach (Baron & Kenny, 1986) integrated with the bootstrapping method, was adopted for mediating analysis, with the composite score of principal leadership as the predictor. Upon the affirmation of the presence of the mediating effects, significance and strength were further assessed. This study stepped further to test the overall effect of the seven core areas of principal leadership, as independent predictors, on teacher professional learning via the possible mediating effects of collaboration. The findings affirmed that, collaboration did play a mediating role between the relationship of principal leadership and teacher professional learning in Hong Kong primary schools.

The knowledge body of educational leadership and school effects are primarily based on research conducted in Western societies. Nevertheless, it has shown great influences on education research and policy adoption worldwide (e.g., Day et al., 2009; MacBeath & Cheng, 2008; Walker & Riordan, 2010). For example, western scholars suggested the existence of a pool of good principal leadership practices universal to all education contexts (Day et al., 2009, p. 11). Based on some similar generic principal leadership practices, researchers in Hong Kong established a hierarchical leadership structure specific to Hong Kong context (Walker & Ko, 2011).

The Hong Kong authorities have been closely following the global trend of educational reforms and initiatives in order to enhance and monitor principal leadership effects on promoting teaching effectiveness (e.g., Hallinger & Lee, 2013; Pan & Chen, 2011; Walker, Hu, & Qian, 2012). Within the shifting educational reform environment in Hong Kong, two broad issues that have stood out - the quality of principal leadership and school effects. As identified by the local studies, teacher professional classroom instruction contributes the most to what students learn in school; and principal leadership on instructional management enhances student academic achievement (Walker et al., 2011, 2012, 2013, 2014).

Also due to the shifting education reforms and pressing accountability environment, most schools are still hierarchical structures typified by top-down bureaucracies and led by the principal solely. In some sense, the tension between the centralization tradition and decentralization tendency in schools hinders teachers' professionalism. It also affects how teachers treat their "workplace autonomy and discretion" (Pang, 2010, p. 352; see also Ingersoll, 1994). Therefore, in investigation of leadership effects and school capacity, school context as well as policy context should be considered.

As a hub for international education, schools in Hong Kong have been facing increasing pressure to be accountable for what they have done – these pressures flow mainly through quality assurance policies mandated by the state (Cheng, 2009; Cheng & Walker, 2008; Ho, 2010; Law, Galton, & Wan, 2007; Walker, 2004). To meet the accountability demands, there have been calls for "studies that examine policy prescriptions" for leadership on the basis of empirical evidence (Heck & Hallinger, 2009, p. 3). However, recent local output focuses exclusively

on the relationships between principal leadership and school improvement (e.g., Walker & Ko, 2011). When the impact of principal leadership and school capacity are addressed synergistically, the researchers were more interested in school improvement over time (Ko, Hallinger, & Walker, 2012; Lee, Walker, & Chui, 2012; Walker, Lee, & Bryant, 2014). Intermediary targets, such as teacher learning and teaching that directly affects student outcome, are seldom considered. Therefore exploration into principal and school factors that link to teacher professional learning, which affects student outcomes, will be practically insightful.

Principal leadership and school effectiveness

Recent scholarly investigations claim that, principal leadership might be the single most important factor leading to school improvement (Day, Sammons, Hopkins, Harris, Leithwood, Gu, Brown, Ahtaridou, & Kington, 2009). Some scholars have identified larger indirect effects of principal leadership through key school or classroom level factors that directly influence teaching effectiveness and student learning (Kyriakides, Creemers, Antonious, & Demetriou, 2009). Their findings suggest the existence of the 'mediated paths' linking principal leadership to school effectiveness.

On the 'mediated paths' some 'intermediary targets' deserve attention. As claimed, to achieve school improvement successful school leaders focus on teacher professional development and instructional effectiveness (Darling-Hammond, 1999, 2009; Hallinger & Heck, 2010, 2011a, 2011b; Leithwood & Day, 2007; Mulford & Silins, 2003, 2009; Spillane, 2006). Robinson and her colleagues (Robinson, 2007; Robinson, LIoyd, & Rowe, 2008) report that among the factors influencing teaching effectiveness, the key one is a principal's promotion of teacher professional development, which will lead to ongoing teacher professional learning and improvement of teaching (also see Darling-Hammond, 2005; Louis et al., 2010; Supovitz & Turner, 2000; DuFour, 1991). In the authors' (forthcoming) study, among the seven areas of principal leadership practices, principals' instructional leadership turns out to be the most powerful principal level predictor, followed by their leadership of teacher professional development. Robinson et al.,'s (2008) meta-analysis of school

leadership effects research identifies principals' involvement in and support for teacher professional development as key means to improve their teaching effectiveness, consequently student achievement (also see Darling-Hammond, 1999, 2009; DuFour, 1991; Glatthorn, 1992; Hallinger & Heck, 2010; Louis et al., 2010; Supovitz & Turner, 2000).

The above findings suggests that principals achieve their leadership effects on student learning mostly through affecting teacher professionalism and teaching effectiveness (Bossert, Dwyer, Rowan, & Lee, 1982; Bridges, 1967; Creemers & Kyriakides, 2008; Darling-Hammond, 1999, 2009; Hallinger & Heck, 1998; Kyriakides et al., 2009). Such findings have encouraged researchers to explore the 'mediated paths' and identify the 'intermediate targets' through which principal leadership influences school effects (Hallinger & Heck, 1998; Kyriakides et al., 2009; Leithwood, Patten, & Jantzi, 2010; Witziers, Bosker & Kruger, 2003).

School Capacity: the 'intermediary targets' and 'mediated path'

The 'intermediary targets' are typically school or classroom level factors that directly influence teaching effectiveness and student learning (Kyriakides et al., 2009). Effects of these factors offer alternatives to examining principal leadership effects on school growth and development (e.g., Bryk & Schneider, 2002, 2003; Hallinger & Heck, 2010; Mulford & Silins, 2009; Robinson et al., 2008). Inquiries into the nature and strength of these alterable factors will contribute to a deeper understanding of successful leadership and school improvement (Leithwood & Jantzi, 2000, p. 417).

A large amount of research has reported that principals influence student achievement through building school capacity to improve teacher professionalism (e.g., Hallinger & Heck, 2008; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Smylie & Hart, 1999). For example, Newmann, King and Youngs (2000) reported that student learning is influenced most directly by teaching effectiveness, which is shaped by teacher professional learning and working environment at school. Youngs and King (2002) maintained that one prominent way through which principals built school capacity for improving teaching effectiveness was through their beliefs and leadership of teacher professional development. Taken together,

teacher professional learning is a fundamental 'intermediary target' between principal leadership and school effects.

On the other hand, the most recent empirical efforts undertaken within this line of inquiry have increasingly sought to employ school capacity scales that incorporate both 'technical' and 'relational' dimensions (e.g., Hallinger & Heck, 2010; Leithwood & Day, 2007; Printy, Marks, & Bowers, 2009; Sebastian & Allensworth, 2012). Within the relational sphere of school capacity, school environments featuring trust (e.g., Hoy, Tarter, & Hoy, 2006; Leithwood & Beatty, 2008), communication (e.g., Danielson, 2006; Wahlstrom & Louis, 2008), and collaboration (e.g., Leonard, 2010; Quicke, 2000; Scribner, Sawyer, Watson, & Myers, 2007) are conceptualized as conditions that mediate the influence of leadership on the professional learning of teachers (e.g., Bryk & Schneider, 2002, 2003; Seashore Louis, 2007; Tschannen-Moran, 2000, 2004; Wahlstrom & Louis, 2008). For example, collegial collaboration and collaboration are found to be the basis for teacher professional practice (Quicke, 2000) and for educational development and improvement (Goddard, Goddard, & Tschannen-Moran, 2007; Hargreaves, 1994a, 1994b).

Teacher collaboration: A key element of school capacity

Although research on teacher collaboration started in the field of educational leadership two decades ago, it is much less explored, if not marginalized (Hargreaves, 1994a, 1994b; Lavie, 2006, p. 773). It is especially the case when compared to other school capacity components such as trust. However, the ability of teachers for collaborative work has become "one of the core requisites of contemporary school reform" (Slater, 2008, p. 324). As espoused values and cultural elements in Jenni and Mauriel's (2004) study, cooperation and collaboration are regarded as critical functions for improving the performance of teachers and school effectiveness (p. 184; see also Goddard, et al., 2007). With ample empirical evidence, Little (1982) asserted that "more effective schools could be differentiated from less effective schools by the degree of teacher collegiality, or collaboration, they practiced" (as cited in Friend & Cook, 1992, p. 423).

'Collaboration' is often used interchangeably or in parallel with the terms 'cooperation' or 'partnership' (Connolly & James, 2006). They both indicate the concept of 'shared work' or the sense of 'working together'. Friend and Cook (1992) provided a general definition of 'interpersonal collaboration', which is "a style of direct interaction between at least two co-equal parties voluntarily engaged in shared decision making" when working toward a common goal (p. 424). In their (1995) study on educational leadership for teacher collaboration, Cook and Friend made it explicit that collaboration was the way teachers implemented a specific activity, but not the purpose or nature of the activity.

Principals can also join and interact in the school wide collaborative process and provide support to promote teacher professional learning. More importantly, they can create opportunities for more people to cooperate and engage in decision making (Tschannen-Moran, 2000). DuFour (1991; 1998) recommended that school principals collaborate with expert teachers and have them share their wisdom with others. Participants in Slater's (2008) study also regarded that principals' support helped shape an environment conducive to collaboration. It takes time and effort for the principal to construct positive collaborative environment and relationships. Human relationships are the building blocks of genuine collaboration in which the interaction between people happen (Cook & Friend, 1991, 1995). As a key indicator of human relations at workplace, collaboration also has emotional underpinnings and should be practiced in an affective process.

Considering the emotional nature of collaboration, principals need to be emotionally competent when playing the leading role in the collaborative process. As Emihovich and Battaglia (2000) noted, collaboration is "very emotional work, where the various partners should expect to remain committed for a considerable period of time" (p. 236). However, principals' leadership for collaboration is deemed to be a process that is anything but peaceful. While supporting the collaborative process, principal leadership is bound to be discomforting, ambiguous, and uncertain (Slater, 2008, p. 331). Beatty (2000) noted that, despite that schools provided places for human relationships to develop, authentic relationships were hard to maintain. Instead, teachers' informal collaboration might be more effective considering leadership's provision for change (Leonard, 2010; Scribner, Sawyer, Watson, & Myers, 2007).

In summary, the prior research indicate that fostering collaboration is important for building school capacity and promoting teacher performance. Leadership forces from principals can strengthen teacher professional learning through enabling collaboration between teachers. In addition, collegial collaboration and cooperation are essential to teacher professional practices (Quicke, 2000) and to educational progress (Hargreaves, 1994b, 2004; Goddard, et al., 2007).

Conceptual Framework

Based on the theoretical background, a conceptual model was established to guide the empirical exploration. The current study examined the nature and role of collaboration as a mediator of principal leadership efforts on teacher professional learning.

To test the potentially mediated relationship, a conceptual model is posted in Figure 1. The fundamental element of school capacity that has direct impact on student achievement, *Teacher Professional Learning*, was set as the distal variable (Hattie, 2009; Leithwood et al., 2008, 2010a, 2010b; Louis et al., 2010; Mulford & Silins, 2003, 2009). The variable *Collaboration* is set as the mediator. In educational settings, the conception of collaboration is mostly based on features of the school environment and its social relations in school (Ebers, 1997). Such is true with the conceptualization of 'collaboration' in this study.
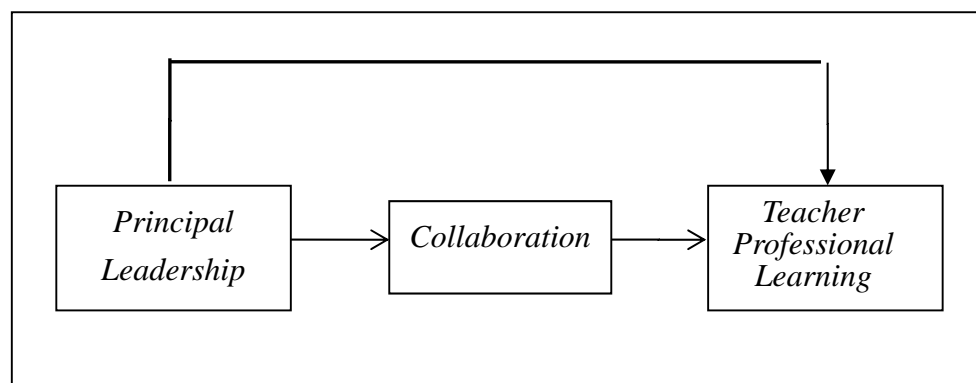

Figure 1. Conceptual model showing mediating effects of *collaboration* on the relationship between *Principal Leadership* and *Teacher Professional Learning*

Day et al. (2009) concluded that there was a pool of good practices used by successful principals. Therefore, principal leadership in the current study was first operationalized as a composite of generic leadership practices of principals. Upon verification of the effects of the mediator *Collaboration*, generic principal leadership practices were operationalized into seven core areas of principal practices. The seven core areas were based upon the framework of key qualities of principal leadership as stipulated by the Hong Kong Education Department (ED, 2002). The framework provided a "baseline reference against which the present knowledge, skills, abilities and attributes of school leaders can be gauged, and future needed development charted" (Walker, Dimmock, Chan, Chan, Cheung, & Wong, 2000, p. 3).

Robinson et al. (2008) synthesized in their meta-analysis of educational leadership studies that, principals' support and involvement in teacher professional learning demonstrated the most robust path linking leadership and learning in schools. Hence the direct promotion of school capacity on the principal's part. Therefore, we proposed that principal leadership has a significant direct effect on teacher professional learning. Meanwhile, a certain proportion of the leadership effects operated through teacher collaboration at school, hence the indirect effect. As shown in Figure 1, the arrows suggest both the indirect and direct effects of principal leadership on teacher professional learning. The current study focuses on the one-way mediating effects arising from principal leadership to teacher professional learning through collaboration.

As one in the series of study, the current study attempted to verify possible mediating effects of *Collaboration*, as a key component of school capacity. Considering the lack of investigation on mediating effects of *Collaboration* in school settings, this study might outline a new way to school capacity building and improvement. Based on data from Hong Kong primary schools, the contextualized study would also add to the body of literature some unique insights that differ substantially from those from the dominant western societies.

Method

This study adopted a cross-sectional quantitative design to identify the potentially mediated principal leadership effect on teacher professional learning through a key school capacity factor, *collaboration*. This section describes the profile of the sampled school and teacher respondents, the instruments for data collection, and the data analysis approach.

Sample

Invitation to join the teacher survey was sent to over 600 Hong Kong primary schools in September 2011. 32 principals responded positively with signed consent forms. In these schools, all those who had teaching workload, including key management staff and general teachers, were invited to do the online survey. Key staff members represented "a pool of informants with a clear understanding of school policies and close awareness of leadership practices of the principals" (Day et al., 2009). General teachers were those who had none or very little administrative duty. Perceptions from key staff and general teachers complemented each other, thereby providing a fuller picture of principal leadership.

All the participants were addressed generally as 'teachers' in the study. To keep their identities confidential, account numbers rather than real names were used. Both the participants and the schools could withdraw at any time. With 970 teacher participants, the response rate reached 72.5% taking account of the total number of teachers in the 32 participating schools. Despite a low school participation rate (6% of all local primary schools in Hong Kong), an examination on the school profile revealed that the participating schools were good representatives the overall local schools considering geographic location hence socio-economic status of the schools, school types (government, aided, direct subsidy, and private), and school sponsoring bodies (author, forthcoming).

Data Collection

Two six-point questionnaire scales were used for this study. The principal leadership scale was adapted from Kwan and Walker's (2008) scale used to measure Hong Kong secondary school key staff's perception of principal leadership.   The number of items was reduced to 33, with those that were not suitable for primary schools removed. The seven dimensions covered were *Strategic Direction*, *Teacher Development Leadership*, *Staff Management*, *Resource Management*, *Quality Management*, and *Instructional Leadership.* The six-point Likert scale included the following response options: 1) "not at all", 2) "very little", 3) "little", 4) "partially", 5) "a lot", and 6) "very significantly".

The program Mplus Version 7.2 (Muthén & Muthén, 1998-2011) was adopted to validate the principal leadership scale, using the default estimation method of Maximum Likelihood.   The scale showed 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, Comparative Fit Index (CFI) = 0.957; Tucker Lewis Index (TLI) = 0.952; Standardized Root Mean Square Residual (SRMR) = 0.032).   Reliabilities (Cronbach's alpha) for the seven factors ranged from 0.914 to 0.960. The results suggested that the principal leadership scale were valid and reliable for the measurement of principal leadership practices in Hong Kong primary schools.

The six-point scale measuring dimensions of school capacity was extracted from Leithwood and Jantzi's (2000) and Walker and Ko's (2011) research.   In this study the two sub-scales measuring *Collaboration* and *Teacher Profession Learning* were combined to use. The former was conceptualized as the possible mediating variable, and the latter was singled out as the distal variable in the mediation analysis.   The six response options ranged from 1) "strongly disagree", 2) "disagree", 3) "somewhat disagree", 4) "somewhat agree", 5) "agree", to 6) "strongly agree".

A CFA model of two latent variables with 12 of the 13 items was established. The fit statistics suggested good model fit (Minimum Fit Function Chi-Square (χ^2) = 170.115, Degrees of Freedom (df) = 52, $p < 0.001$; Root Mean Square Error of Approximation (RMSEA) = 0.048, Comparative Fit Index (CFI) = 0.976; Tucker Lewis Index (TLI) = 0.969; Standardized Root Mean Square Residual (SRMR) = 0.030).   Cronbach's alpha coefficients for the four factors ranged between 0.

932 and 0.922, respectively. The results suggested that the school capacity scale met acceptable standards of internal consistency and validity.

Data Analysis

The conceptual model proposed both direct and indirect effects *of Principal Leadership* on *Teacher Professional Learning* through *Collaboration*. First the simple mediation analysis was conducted using a composite of raw measures of the 33 items measuring principal leadership. Upon verification of the presence of the indirect (i.e., mediating) effects, test of the significance and strength of the indirect effects was conducted via the bootstrapping method.

Finally an omnibus measure was obtained through testing the overall direct, indirect, and total effects of principal leadership on teacher professional learning. Determined by the methodological design of mediation analysis, the present study keeps the core areas parallel, independent of each other, while the mediated effects are assessed. Bootstrapping also yielded ratios and sizes of the direct, indirect, and total effects for relevant paths in the tested model. This advance in analytical methodology particularly strengthened Baron and Kenny's (1986) approach in which conclusions can be subject to Type I error (Preacher & 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 1,000 or more times (Hayes, 2013).

Results

Table 1 shows the descriptive statistics for the key variables and core areas of principal leadership. The teachers generally gave positive feedback on their principals' leadership practices and school capacity.

Table 1. Descriptive Statistics of the Seven Dimensions of Principal Leadership

Dimension	Mean	Std. Deviation
Principal Leadership	3.72	.94
Strategic Direction	3.79	.97
Teacher Professional Development	3.78	1.03
Staff Management	3.62	1.01
External Communication	3.69	1.07
Resource Management	3.74	1.05
Quality Assurance	3.66	1.00
Instructional Leadership	3.76	1.04
Collaboration	4.46	.76
Teacher Professional Learning	4.47	.73

Table 2 shows results of the causal steps regression analyses. The first step determined that *Principal Leadership* was a significant predictor of *Teacher Professional Learning*. *Teacher Professional Learning* was regressed on the composite measure of *Principal Leadership*. *Principal Leadership* displayed a significant direct effect on *Teacher Professional Learning* ($\beta = 0.275$, $p < .001$) and accounted for 7.51% of the total variance of *Teacher Professional Learning*. This was further proved with the 95% bootstrapping Confidence Interval, which did not include 0 (.166, .260).

Table 2. Hierarchical Regression of Teacher Professional Learning on Principal Leadership through Collaboration (N=970)

Step	Variable	B	Std. Error	t	Sig. Level	LLCI	ULCI
Step 1	Dependent Variable: *Teacher Profession Learning*						
(Total Effect)	*Principal Leadership*	.213	.024	8.881	.000	.166	.260
	$R = .275$, $R^2 = .075$, $F(1, 968)= 78.871$, $P < .001$						
Step 2	Dependent Variable: *Collaboration*						
	Principal Leadership	.222	.025	8.822	.000	.172	.271
	$R = .273$, $R^2= .074$, $F(1, 968)= 77.826$, $P < .001$						
Step 3	Dependent Variable: *Teacher Profession Learning*						
	Collaboration	.726	.020	36.447	.000	.680	.770
	$R = .761$, $R^2= .578$, $F(1, 968) = 1328.418$, $P < .001$						
Step 4	Dependent Variable: *Teacher Profession Learning*						
(Direct Effect)	*Collaboration*	.708	.021	34.335	.000	.667	.748
	Principal Leadership	.056	.017	3.355	.001	.023	.089
	$R = .764$, $R^2 = .583$, $F(2, 967) = 676.875$, $P < .001$						

In the second step, *Collaboration* was regressed on *Principal Leadership.* A significant positive effect ($β$ = 0.222, p < .001) of *Principal Leadership* on *Collaboration* was detected. The former explained 7.45% of the total variance of *Collaboration.* Correlation between the two variables was at a low level (zero order R = .273).

The third step explored the relationship between *Collaboration* and *Teacher Professional Learning*. *Collaboration* showed a considerably large effect on *Teacher Professional Learning* ($β$ = .726, p < .001)*,* explaining a much larger proportion (57.91%) of the total variance of *Teacher Professional Learning* (see Table 2).

.213***
(.166, .260)

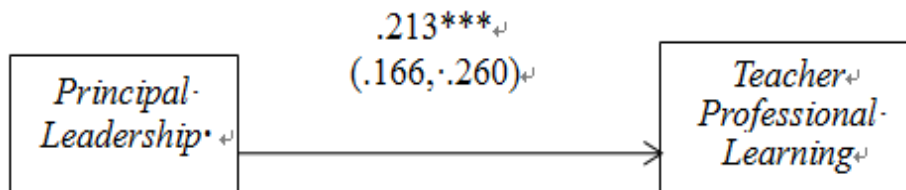Principal Leadership → Teacher Professional Learning

Figure 2. The Total Effect Model Showing Effect of Principal Leadership on Teacher Professional Learning

Note. The statistics in the bracket are the lower and upper limit of the 95% confidence intervals for population value that the bootstrapping generated (the same hereafter).

The fourth step examined the effect of *Principal Leadership* on *Teacher Professional Learning* after controlling for the effect of *Collaboration*. In this analysis *Collaboration* was entered in the first block in the hierarchical regression

and *Principal Leadership* the second. As shown in Table 2, *Principal Leadership* was still a significant predictor of *Teacher Professional Learning.* The regression weight reduced substantially but not to 0 (i.e., from .213 to .056, *p* < .001). After controlling for *Collaboration*, the explanation power of *Principal Leadership* reduced to 1.14% of the variance of *Teacher Professional Learning.* In this regression analysis *Collaboration* continued to explain 54.91% of the total variance of *Teacher Professional Learning*. This pattern of results suggests that *Collaboration* was very likely a partial mediator in the mediated relationship.

As shown in Figure 3, the indirect effect of *Principal Leadership* (.157) on *Teacher Professional Learning* was the product of the direct effect of *Principal Leadership* on *Collaboration* (.222) and direct effect of *Collaboration* on *Teacher Professional Learning* (.708). The total effect of *Principal Leadership* (.213) on *Teacher Professional Learning* was composed of the direct effect (.056) and the indirect effect (.157) of it via *Collaboration.*
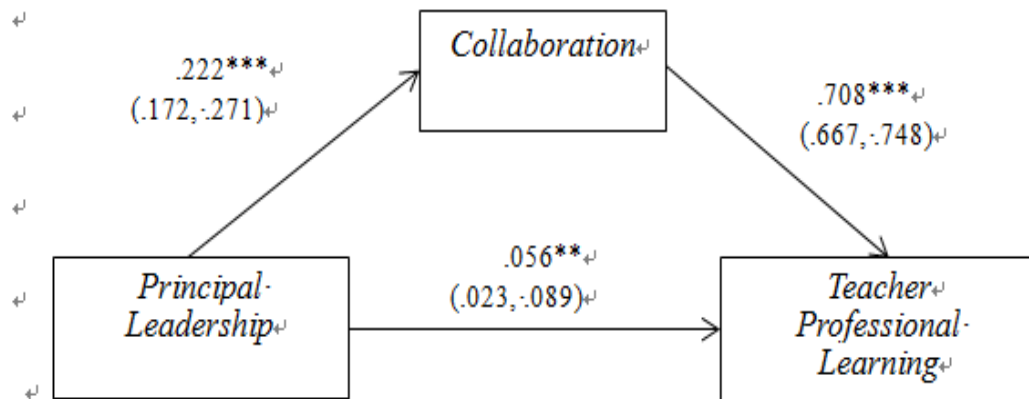

Figure 3. The Single Mediation Model Showing Effects of Principal Leadership on Teacher Professional Learning through Collaboration

The four-step regression analyses followed Baron and Kenny's (1986) procedures to determine the presence of the mediated relationship. Due to the inherent weaknesses of the stepwise regression, the conclusion might be erroneous (Preacher, 2004). Therefore, the bootstrapping method was used to test whether the mediated relationship was statistically significant. In this analysis, if the indirect effect of *Principal Leadership* on *Teacher Profession Learning* through *Collaboration* was significant, the mediating effect of *Collaboration* was supported. This procedure produced a very similar (.156) and statistically significant indirect effect. To conclude, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* through *Collaboration* is significant.

Table 3 also shows the ratios of the indirect effect in contrast with the total effect and direct effect, and the statistical significance of the ratios. The indirect effect of *Principal Leadership* on *Teacher Professional Learning* constituted a significant 73.6% of its total effect on *Teacher Professional Learning*. In other words, approximately 73.6% of the total effect of *Principal Leadership* on *Teacher Professional Learning* is mediated by *Trust*. Further, the indirect effect was 2.8 times of the direct effect of *Principal Leadership* on *Teacher Professional Learning*. The R-squared mediation effect size and Preacher and Kelley's (2011) Kappa-squared, both reported only for simple mediation analysis, again indicated that the mediated effect is medium in size and statistically significant.

Omnibus tests using the seven core areas of the *Principal Leadership* as independent predictors also affirmed a small but significant mediating effect of *Trust* on *Teacher Professional Learning* (Bootmean = .083, SE = .018). 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 indicated small but statistically significant direct effects and total effects of *Principal Leadership* practices on *Teacher Professional Learning*.

Table 3. Bootstrapping Results for Indirect Effects of Collaboration on the Relationship between Principal Leadership and Teacher Professional Learning

Bootstrap Results for Indirect Effects	Indirect Effects of IV on DV through Mediators				Bias Corrected and Accelerated Confidence Intervals		Bias Corrected Confidence Intervals		Percentile Confidence Intervals	
	Boot Mean	SE	Boot LLCI	Boot ULCI	Lower	Upper	Lower	Upper	Lower	Upper
Collaboration	.157	.023	.112	.204	.112	.203	.112	.203	.111	.202

Effect Size Indices for Indirect Effects	Effect	Boot SE	BootLLCI	BootULCI
Ratio of indirect to total effect of X on Y (ab/c)	.736	.074	.609	.905
Ratio of indirect to direct effect of X on Y (ab/c′)	2.792	17.526	1.550	9.114
R-squared mediation effect size	.0701	.019	.037	.111
Preacher and Kelley (2011) Kappa-squared	.242	.030	.183	.302

Notes:

1. Boot Mean: the indirect effect calculated in the original sample.

2. Boot SE: the mean of the indirect effect estimates calculated across all bootstrap samples.

3. Boot LLCI: The lower limit of the 95% confidence intervals for population value of the indirect effects.

4. Boot ULCI: The upper limit of the 95% confidence intervals for population value of the indirect effects.

Discussion and Interpretation

The study empirically examined the mediating effects of c*ollaboration* in the relationship between principal leadership and teacher professional learning. The descriptive findings suggested that, on the whole the participating teachers had a positive feedback on principal leadership and capacity building in their schools. Teachers' recognition and appreciation of principal leadership suggested that principals played a key role in teachers' work satisfaction. The principals basically complied with the guidelines of principal leadership, as stipulated by the Hong Kong education authorities (ED, 2002). The guidelines present "a set of expectations regarding the performance of principals" (Walker et. al., 2000, p. 4). They also help principals "focus their leadership and management on the key goals of school improvement and student learning" (Walker et al., 2000, p. 4). Compliance with the guidelines suggests that the principals generally showed the key qualities of good principalship.

As revealed from the mediation analysis, collaboration was central to teacher professional learning. In a long run, collaboration and collegiality are essential to teacher instructional practice (Quicke, 2000) and to educational development and improvement (Hargreaves, 1994a, 1994b). Collaboration is an exchange of resources, which occur when the important decision-makers believe that joint work can protect, and perhaps enhance key organizational resources (Cook & Friend, 1991, 1995; Ebers, 1997; Schannen-Moran, 2000). Meaningful collaboration can only occur when people effectively communicate with one another. In Hong Kong, teacher *Collaboration* might be a positive consequence of the requirement of an integrated curriculum for which teachers from different subject panels work together to design teaching contents and do the assessment and evaluation together. Within a subject panel, there are also collective lesson preparation and instructions. The purpose is to let teachers open the door of their classroom and learn from each other.

The mediated effects of principal leadership on teacher professional learning prove that the main impact of school leadership is not through direct impact on teachers but rather by creating a cooperative school culture and environment for teacher learning to thrive (Hallinger & Heck, 1998, 2010; Mulford & Silins, 2003; Printy et al., 2009; Robinson et al., 2008). Principals play a key role as 'catalysts

for change' (Hall & Hord, 2002; Hallinger, 2003; Sleegers et al., 2002; Spillane & Thompson, 1997) and enablers of teacher development (Barth, 1990; Newman et al., 2000; Robinson et al., 2008), and leaders of learning.

Other supportive practices from the principal include showing care, valuing others, building trust and encouraging communication in the affective process. For example, Tschannen-Moran (2000) reports that collaboration is linked to trust, and trust is predictive to the level of collaboration at school. To make it explicit, for principals an effective way to constructing a climate that supports collaboration is to enable a trusting atmosphere. Participants in Slater's (2008) study identify that specific communicative behaviors of principals also support collaboration at the school level. In their (2008) study all participants agreed that to enhance collaboration, principals must have developed skills for effective communication. However, the principal's role should be supportive or conducive rather than directive.

In the pressing accountability environment in Hong Kong, leadership for teacher learning highlights the relational, emotional side of principal practice (Beatty, 2000; DiPaola, & Tschannen-Moran, 2003; Donaldson, 2001; Leithwood & Beatty, 2008;). It is especially true considering the relatively weak human leadership ability of principals in Hong Kong (Cheng, 2000; Wong, 2004). In this sense, the development of relational and emotional competence of the principals is necessary. Meanwhile, principals are suggested put more effort on instructional leadership while supporting teachers' professional learning. While integrating the demands from internal and external environments and institutionalizing their strategic directions, principals should carefully translate system-level goals into feasible school level practices (Leithwood, 2001). As resource providers, collaborators and even role models, visible presence of principals and their effective leadership are the preconditions of successful teacher professional learning.

This brings the discussion back to the conclusive finding that principal leadership plays a key role in creating and sustaining a school environment featuring genuine collaboration as a core condition for teacher learning and change. Genuine collaboration is also critical to ensure effective school functioning. Effective collective work help teachers come to understandings across differences

and work together to shape the environment in which they work and meet the targets of their professional learning (Ryan & Rottmann, 2009; Young, 2011).

Limitations

This study has two notable limitations, though measures have been taken for control and compensation.

First, this study adopted a quantitative cross-sectional survey design. Cross-sectional design reflects only 'snapshot' nature of phenomenon. It suggests strength of association but not causal inferences concerning the relationships among the variables (Goddard, Salloum, & Berebitsky, 2009, p. 300). To outline 'directionality of the relationships' that are postulated in this study, theoretical propositions and empirical evidence from previous research are gathered to support. Therefore, the term 'effects' in this study indicates causal relationships.

Additionally, measurements of the present study were not from multiple sources, and the data were not collected through multiple strategies or at different time points. Instead, all measures were teacher perceptions collected through one-off online questionnaire survey. Admittedly, longitudinal design is more rigorous at outlining trajectories of change, or dynamic relationship over time. However, a cross-sectional design with measures from a single source suffices when the purpose is to identify relatively static relationships within a less complicated conceptual framework. Such is the case in the current study.

Implications and recommendations

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; Hallinger & Heck, 1998;; Leithwood et al., 2008; Robinson et al., 2008). Investigations in this field contribute towards both theoretical richness and practical implications.

The significant but small direct effects of principal leadership on teacher professional learning might be attributed to some other leadership sources in schools. It is especially the case considering the prevalence of distributed

leadership and teacher empowerment in recent years (e.g., Ho, 2010; Law, Galton, & Wan, 2007; Shouse & Lin, 2010). Within the school management team, principals might share their leadership power and responsibilities with vice principals, Heads of Department, panel chairs, etc. In future studies, if effects from these alternate sources are taken into account, the overall leadership effects might increase significantly. Through distinguishing and combining leadership effects from varied sources, more factors that contribute to school capacity and teacher professional learning will be identified (Day et al., 2009; Leithwood & Day, 2007).

Principals can enhance teacher professional learning through strengthening school capacity, especially that regarding collaboration. The enhanced teacher professional learning will in turn contribute towards school capacity building. The positive interaction is considered "an important prerequisite for addressing the continuous stream of changes" in schools (Thoonen, Sleegers, Oort, Peetsma, & Geijsel, 2011, p. 497). This is certainly true in Hong Kong schools, where the series of education reforms in recent decades have created a bottleneck in the process of school transformation (Cheng & Walker, 2008). The current study suggests some possible approaches that schools can take to counteract this effect. Possible means are to create conditions and develop a capacity for teacher collaboration and professional learning, ultimately school improvement.

The workplace environment has a direct impact on teachers' instructional practices. Principals should "possess a macro view and know-how about the strategies that enhance a learning and expansive environment in schools" (Law, 2011, p. 406; see also Harris, 2008; Marks & Louis, 1999). They can also take the initiative to enhance interpersonal relationships between teachers. Occasions like organized tours or end-of-term retreats would provide opportunities for teachers to have close and informal interaction. Above all, principals should communicate effectively and clearly, and collaborate with staff rather than merely set directions for them. Respect, equality and openness among the principal and teachers are also important for the construction of a supportive school environment.

While building the whole school into a site for teacher professional learning, there can be small learning groups in subject panels or for cross-disciplinary

activities. Communication and collaboration will be the means for collective work, through which teachers get to know each other and build trust. It should be noted that, this type of collective learning and teaching should not become "formal structures of planned collaboration" (Leonard, 2010, p. 237). Spontaneous informal collaboration between teachers is of greater effectiveness in terms of leadership provision for change (Leonard, 2010; Scribner et al., 2007).

Given the importance of human relational capacity in schools, implementers of leadership development programs should design the portfolio of interpersonal skills to help principals have the competences to build school capacity, e.g., the emotional competencies needed to encourage teacher collaboration at school. As Cheng (2000) and Wong (2004) pointed out, Hong Kong principals were strong in educational and structural leadership, but not in human leadership. Problems that may occur with principals during the process of school capacity building, e.g., inappropriate approaches to communicate with staff, should be pinpointed. The principal recruitment and development procedures should ensure that principals have the capacity to establish and maintain healthy interpersonal relationships among staff.

Schools are expected to enhance capacity building through improving teachers' learning and instruction. However, the teaching profession is still dominated by the inherent individualism of teachers. Teachers are reluctant and even resistant to break the invisible structures that keep them separate (Hargreaves, 1992, 1994, 2007; Harris, 2010). System change is called for to create the structural and socio-psychological features of schools that support teacher professional learning, which is considered necessary for school improvement to occur (Glatthorn, 1992; Harris, 2010; Marks, & Printy, 2003).

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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 <u>three</u> 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

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 B. Survey items measuring teacher perceptions of school capacity

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

Collaboration

1. Our team members 'swim or sink' together.
2. Our team members want each other to succeed.
3. Our team members seek compatible goals.
4. The goals of team members go together.
5. When our team members work together, we usually have common goals.

Teacher Professional Learning

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

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ASIA LEADERSHIP ROUNDTABLE

BANGKOK
2015

**Building and Connecting an
Asian Knowledge Base in Educational Leadership**

March 8-10, 2015   @   Chulalongkorn University

Organizers: The Joseph Lau Luen Huen Charitable Trust Asia Pacifice Centre for Leadership and Change
Hong Kong Institute of Education, HKSAR, CHINA

Faculty of Education, Chulalongkorn University
Bangkok, Thailand

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