Mediating Effects of School Capacity on the Relationship between Principal Leadership and Teacher Professional Learning: Evidence from Hong Kong Primary Schools

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By

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STATEMENT OF ORIGINALITY

I, LI, Lijuan, hereby declare that I am the sole author of the thesis and the material presented in this thesis is my original work except those indicated in the acknowledgement. I further declare that I have followed the Institute's policies and regulations on Academic Honesty, Copy Right and Plagiarism in writing the Thesis and no material in this thesis has been published or submitted for a degree in this or other universities.

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ABSTRACT

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for the degree of Doctor of Education

The Hong Kong Institute of Education

The series of education reforms that have taken place in Hong Kong are part of a global movement. While restructuring and adapting to meet the demands of these reforms, Hong Kong principals are also expected to build school capacity, which research shows to be directly associated with teacher learning (Leithwood, Day, Sammons, Harris, & Hopkins, 2006). Of the array of school capacity-related factors in operation, those connected to human relationships are most likely to facilitate teacher professional learning (e.g., Li, Hallinger, & Ko, submitted). They include trust (e.g., Hoy, Tarter, & Hoy, 2006; Leithwood & Beatty, 2008; Sleegers, Geijsel, & Van den Berg, 2002), communication (e.g., Danielson, 2006; Tschannen-Moran, 2000; Wahlstrom & Louis, 2008), and collaboration (e.g., Leonard, 2010; Quicke, 2000; Scribner, Sawyer, Watson, & Myers, 2007) at the school level.

These human relationship-based factors also extend to the work environment and school success. Hence, to promote teacher learning, principals can use their human relational competencies to create a positive school environment in the process of

capacity-building. This study constitutes a contextualized inquiry into how the school capacity factors of trust, communication, and collaboration mediate the effects of principal leadership on teacher professional learning in Hong Kong primary schools. Verification of these indirect effects illuminates the mediated pathways between principal leadership and teacher learning.

Survey data were collected from a validated sample of 970 teachers from 32 primary schools. The two questionnaires used in the survey, which covered a range of principal leadership and school capacity factors, were found to be reliable and valid. This quantitative study is the first to examine teachers' perceptions of principal leadership practice, school capacity, and teacher professional learning and the associations among them. Baron and Kenny's (1986) causal steps procedure, integrated with the bootstrapping method, was adopted to test the presence of the mediating effects of trust, communication, and collaboration both individually and jointly. Where the seven core areas of principal practice revealed mediated effects on teacher professional learning, the strength of those effects was further examined. [1]

The survey respondents generally gave positive feedback on principal leadership practices, school capacity, and teacher professional learning in their schools. Evidence from a series of mediation analyses confirms the hypothesis that all three school capacity factors are significant mediators between principal leadership and teacher professional learning. Collaboration exhibits the strongest mediating power, followed by communication and trust. When principal leadership is conceptualized as the seven core areas of principal practice, teacher development and instructional leadership are sufficiently strong to directly affect teacher professional learning, whereas strategic direction has both direct and indirect negative effects and staff management has direct and indirect positive effects. Finally, managerial leadership (i.e., external communication, resource management, and quality assurance) exerts no

[1] The seven core areas of generic principal leadership practices are strategic direction, instructional leadership, teacher development, quality assurance, staff management, external communication, and resource management. The seven core areas are also used in other recent studies conducted in Hong Kong (e.g., Walker & Ko, 2011; Ko, Hallinger, & Walker, 2012).

significant influence.

These findings are indicative, if not generalizable to, Hong Kong-wide primary school practice. Their implication is that principals should create conditions that facilitate the building of trust, communication, and collaboration to ensure that teacher professional learning develops and thrives in schools. When balancing their strategic direction with adequate staff management competencies, principals should also stress teacher development and instructional leadership.

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CHAPTER 1
INTRODUCTION

Introduction

The aim of this study is to advance knowledge of the mediated principal leadership effects on teacher professional learning in Hong Kong primary schools. Drawing on previously identified theoretical linkages, it examines the nature of trust, communication, and collaboration and the role they play in the relationship between principal leadership and teacher professional learning.

This chapter provides an overview of the entire study. It is divided into nine sections. The first section briefly outlines the educational context of Hong Kong and describes the pressures and challenges that principals and teachers face in the pressing accountability context. The second outlines the current research frontiers in the field of educational leadership and school capacity to illuminate the intermediary targets and mediated pathways between principal leadership and teacher professional learning, the latter of which is a key component of school capacity. The third section

introduces empirical investigations using Hong Kong data, and provides updates on the current state of local research. The research problem is then stated in Section 1.4, and the aim and purpose of the study outlined in Section 1.5. Section 1.6 delineates the study's research questions and the theory-grounded hypothesis. The study's significance is discussed and terms defined in Sections 1.7 and 1.8, respectively. Section 1.9 concludes the chapter with a description of the organization of the thesis.

1.1 Educational changes and reforms in Hong Kong

The education authorities in Hong Kong have eagerly followed Western education reforms over the past few decades. These active reforms "require a strong and effective leadership to bring forth the change successfully" (Wong, 2003, p. 243). To meet the demands of the reforms, Hong Kong schools have also undergone waves of change in the principles of school leadership (Cheng, 2008; Cheng & Tam, 1997). During the 1980s, when the first wave of change known as the effective school movement was initiated, principals were expected to "focus on internal improvements for achieving planned goals" (Cheng, 2011, p. 256; see also Cheng, 2003). During the second wave, known as the quality school movement, principals were expected to direct their attention externally to market competition and stakeholder satisfaction. The new millennium has brought a third wave, known as the world-class school movement, during which principals are encouraged to concentrate on the "multiple and sustainable developments of students, teachers, and the school" (Cheng, 2011, p. 256).

Hong Kong schools have faced increased pressure under all three waves of school leadership change. Schools are where educational reform initiatives are implemented and where changes occur. At the school level, principals are held accountable for meeting educational quality standards, implementing school-based management, and promoting teaching effectiveness and teachers' professional development (Cheng, 2003, 2009, 2011). Teachers, who are on the frontline of education, are the ones who have to translate these accountability demands into student outcomes.

The series of reform measures implemented by the Hong Kong educational authorities have placed particular stress on quality assurance, school-based management (SBM), and school-based curricula (Mok, Gurr, Izawa, Knipprath, Lee, Mel, Palmer, Shan, & Zhang, 2003; Walker, 2003; Walker & Ko, 2011). In 2000, to promote quality assurance, the Education Department (ED) developed a Framework of Performance Indicators for schools to use in evaluating their own performance. Then, in 2004, an external school review system was established to validate schools' self-evaluations in external reviews taking place every four years (Cheng & Walker, 2008; Kwan, 2011). The public disclosure of the information included in the external review reports can have a considerable effect on a school's image, and is thus considered sensitive. In addition, the education authorities also conduct a Territory-wide System Assessment (TSA) of the core subjects for Primary 3 to Primary 6 students. In addition to schools' self-evaluations and external reviews, their TSA results are considered another accountability mechanism. Principals and teachers often feel under pressure to receive high scores in these school evaluation systems and sometimes find it difficult to balance and manage the "number and intensity of simultaneous top-down initiatives" (Cheng & Walker, 2008, p. 512).

To further increase school accountability and education quality, the ED put forward an SBM proposal in the 1990s. The SBM proposal also aimed to involve the community and other stakeholders in strengthening the structure and governance of schools (Education and Manpower Bureau, 2002, 2004, 2005; Education Commission, 1997). The SBM initiatives started to be implemented at the school level in 2000. They expanded school principals' work responsibilities and challenged the existing high power-distance environment in schools (Cheng & Walker, 2008; Kwan, 2011; Wong, 2003; Yu, Leithwood, & Jantzi, 2002). In addition to aligning system goals with the school's vision and providing strategic direction, principals had to devote extra effort to external communications and staff management. The expansion of their school management tasks distracted principals from their instructional role at the same time that, to meet the accountability demands of SBM, they had to be good instructional leaders (Wong, 2003).

There has also been a trend toward decentralizing principals' leadership power by

including both internal and external stakeholders (Education Commission, 1997; Yu et al., 2002), which has led to a dramatic increase in the demands on and workload of teachers. Apart from maintaining and improving their teaching effectiveness, teachers are also expected to be involved in the school's management and leadership. Teachers who are involved in the strategic development of their schools have become middle-level leaders (Gurr & Drysdale, 2013) or middle managers (Flessa, 2012), such as panel heads, heads of department, or curriculum coordinators (Ng, 2013; Ng & Chan, 2014; Tang & Choi, 2009). Vice-principals are also considered mid-level leaders in Australia and Hong Kong (Gurr & Drysdale, 2013; Ng, 2013). Leadership from teachers and mid-level leaders constitutes a breakthrough in the conventional hierarchical leadership structure of schools. Although representing a more democratic school management approach, this distributed leadership style has also been found to hinder decision-making efficiency and create other school management concerns (Ng & Chan, 2014). Because of the increasingly pressing accountability climate, increased tension between conventional centralized principal leadership and decentralized distributed leadership can be found in many schools. To further strengthen SBM, in 2001 the Curriculum Development Council established guiding principles and a new school-based curriculum framework to replace the existing central curriculum in primary schools (Cheng, 2003; Cheng, Chow, & Tsui, 2000). The intent was for schools to design flexible, tailor-made curricula on the basis of these guidelines, thereby raising teaching and learning autonomy and hence quality. However, the guidelines presented challenges to both principals and teachers, who had to "shift from a long-term organizational dependence on a central curriculum towards a school-based curriculum" (Cheng & Walker, 2008, p. 510). As a result, both were faced with insufficient time and competence to develop a well-crafted, high-quality school-based curriculum.

Additional challenges stem from Hong Kong's school streaming policy. Despite its stated intention of reducing the negative streaming effects of the previous five-tier allocation system, the new three-tier Secondary School Places Allocation System (SSPA) has done little to mitigate those effects (Ko, 2010; Lau, 2005). The new SSPA measures students' Primary 6 internal assessment results against the sampled average

of the territory-wide Pre-Secondary One Hong Kong Attainment Test (Pre-S1 HKAT) results. Accordingly, the total number of primary students is divided into three bands. Each band comprises one third of the total new cohort of students, with secondary school places allocated accordingly (Cheng, 2009; Ko, 2010). Although the new SSPA system, which is controversial with the public, does not place immediate pressure on primary schools, they are held accountable for preparing students to attend higher-band secondary schools in the future. After all, it is primary school graduates who are individually banded and matched with secondary schools under the SSPA. Primary schools that produce better graduates enjoy a better image.

The aforementioned system-level reform measures have put both principals and teachers under considerable pressure. In addition, both parties live in an increasingly complex and constantly changing world. Hong Kong is exposed not only to Eastern and Western educational conventions, but also to the philosophies of egalitarianism and elitism (Lau, 2005). Disputes over the medium of instruction to be used in schools and other language issues also created controversies in the post-colonial transition stage. To respond to the educational needs of students and the labor market, recent years have seen a push toward the development of teacher professionalism in Hong Kong. Beyond instruction in the classroom, teacher professionalism encompasses an understanding of the values of the teaching profession.

In teachers' progression toward professionalism, continuing professional development (CPD) has had a profound influence. In 1997, a school review led by the University Grants Committee and Advisory Committee on Teacher Education and Qualifications (ACTEQ) recommended the development of a qualified teaching profession and CPD for teachers. ACTEQ subsequently established a Teacher Competencies Framework for teachers' professional development, which provided a "reference for teachers and schools in formulating [CPD] plans specific to the person and appropriate to the school at a particular time" (Cheng, 2009, p. 74). Schools were requested to put CPD on their development agendas, and it was recommended that teachers attend professional development programs lasting at least 150 hours in the three-year trial period (Cheng, Chow, & Mok, 2004; ED, 2013).

To further optimize teacher professionalism and teaching effectiveness in schools, the

ED has formulated a number of other operational policies, such as development of a language proficiency assessment for language teachers that quickly became a touchstone, rather than threshold, for the teaching profession. It also launched the Quality Education Fund and Chief Executive's Award for Teaching Excellence to provide funding for and encourage school-initiated action research (ED, 2002a, 2013).

The sustainable development of schools, teachers, and students advocated by the education authorities in Hong Kong is one of the main drivers of the educational changes seen worldwide in the 21st century. The series of educational initiatives implemented in Hong Kong have put teachers on a tightrope. As Cheng (2009, p. 75) explained, "over competition from marketization, the close control from accountability measures, the increasing workload from numerous initiatives, the de-professionalization from over management and monitoring and the high pressure from uncertainties and ambiguities in the education environment" are all potentially damaging to teaching effectiveness (see also Cheng, 2008).

In summary, the educational changes and reforms in Hong Kong have presented challenges to schools, principals, and teachers. Possible explanations for their challenging nature include a lack of support for implementation from theory-based knowledge, stakeholder hesitancy, and a lack of stable financial assistance (Cheng, Mok, & Tsui, 2002). As a result of both global educational reforms and local developments, principals are currently expected to meet the challenges of internationalization and global competition while maintaining a high degree of accountability and teacher professionalism (Cheng & Walker, 2008; Walker & Riordan, 2010). Although positive achievements have been recorded, frustration and even depression among principals and teachers have also been noted. In addition, bottleneck effects, or "reform syndrome," have also emerged (Cheng, 2004, 2008, 2009). The deterioration in teachers' morale and commitment to work may well result in failures in the education sector. A better understanding of educational reforms and principal leadership effects in Hong Kong can also shed light on educational structures and initiatives in other Asian contexts (Cheng, 2009; Walker & Riordan, 2010).

1.2 Theoretical background

1.2.1 Principal leadership and school effectiveness

Research in the field of educational leadership establishes that principal leadership is second only to curriculum quality and teacher instruction "among all school-related factors that contribute to what students learn at school" (Leithwood, Day, Sammons, Harris, & Hopkins, 2006, p. 17; see also Leithwood & Riehl, 2003), accounting for approximately one-quarter of overall school effects (Day, Sammons, Hopkins, Harris, Leithwood, Gu, Brown, Ahtaridou, & Kington, 2009; Leithwood & Riehl, 2003). However, other researchers assert that principal leadership has a limited direct effect on school outcomes (Day, Leithwood, & Sammons, 2008; Hallinger & Heck, 1998; Mascall, Moore, Jantzi, 2008). Instead, they claim, principal leadership is indirect in nature, and mediated by conditions that directly affect teaching effectiveness and, in turn, student achievement and school improvement (Hallinger & Heck, 1998; Hallinger, Lee, & Szeto, 2013; Heck & Hallinger, 2010, 2011; Klar & Brewer, 2013; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Nir & Hameiri, 2014; Witziers, Bosker, & Kruger, 2003). In short, principals exert an effect on student learning by "ensuring that resources and processes are in place to enable teachers to teach well" (Leithwood & Riehl, 2003, p. 4).

Previous research suggests that to achieve school improvement school leaders should focus on teacher development, instructional effectiveness, and school capacity development (Darling-Hammond, 1999, 2009; Hallinger & Heck, 2010, 2011a, 2011b; Leithwood & Day, 2007; Leithwood, Patten, & Jantzi, 2010; MacBeath & Cheng, 2008; Mulford & Silins, 2003, 2009; Spillane, 2006). Robinson (2007) and Robinson, LIoyd, and Rowe (2008) also report that, of the various factors influencing teaching effectiveness, principals' promotion of teacher development is key, as it leads to ongoing teacher professional learning and teaching improvement (see also Darling-Hammond, 2005; DuFour, 1991; Louis et al., 2010; Supovitz & Turner, 2000). Similarly, Li, Hallinger, and Ko (submitted) find that, of the seven core areas of

principal leadership practice (as specified in Note 1), instructional leadership is the most powerful principal-level predictor, followed by principal leadership in the area of teacher development.

By and large, principals exert leadership effects on student learning primarily by affecting teacher professionalism and classroom instruction (Bossert, Dwyer, Rowan, & Lee, 1982; Bridges, 1967; Chang, 2011; Creemers & Kyriakides, 2008; Darling-Hammond, 1999, 2009; Hallinger & Heck, 1998; Kyriakides, Creemers, Antonious, & Demetriou, 2009). In other words, for principals, the most efficient means of promoting student achievement is improving teacher practices through professional learning. These findings shed light on the potential intermediary targets or mediated pathways through which principal leadership influences school outcomes (Hallinger & Heck, 1998; Kyriakides et al., 2009; Leithwood et al., 2010; Witziers, Bosker & Kruger, 2003).

1.2.2 School capacity: Intermediary targets and mediated paths

The intermediary targets between principal leadership and school effectiveness are typically school- or classroom-level factors that directly influence student learning, including teaching quality and teacher professionalism (Cheng, 1994c; Kyriakides et al., 2009). Most school-level factors are related to the teaching environment (Hsieh, 2010; Li, Chiang, & Chiao, 2010), whereas most classroom-level factors constitute "some form of teacher practice" or are related to general teacher learning and teaching (Chang, 2011; Leithwood, 2007, p. 615; also see Love & Kruger, 2005). If well managed, both school- and classroom-level factors contribute to school capacity-building, and are therefore regarded as components of school capacity.

There is a large amount of compelling research showing that principals influence student achievement by building school capacity to improve teacher professionalism (e.g., Hallinger & Heck, 2008; Louis et al., 2010; Smylie & Hart, 1999). For example, principal leadership can have a positive effect on school conditions and teacher commitment, which subsequently affect teachers' learning and teaching. School

capacity may be the most influential channel through which principals affect teacher practice and student learning (Leithwood, 2007). Indeed, Newmann, King, and Youngs (2000) report that student learning is influenced most directly by teaching effectiveness, which is shaped by teacher professional learning and other school-based capacities. Youngs and King (2002) maintain that a prominent way for principals to build school capacity in a way that improves teaching effectiveness is to manifest their beliefs and lead teachers' professional development.

The most recent empirical efforts addressing this line of inquiry use 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, a school environment characterized by trust (e.g., Hoy, Tarter, & Hoy, 2006; Leithwood & Beatty, 2008; Sleegers et al., 2002), communication (e.g., Danielson, 2006; Tschannen-Moran, 2000; Wahlstrom & Louis, 2008), and collaboration (e.g., Leonard, 2010; Quicke, 2000; Scribner, Sawyer, Watson, & Myers, 2007) is seen as providing the necessary conditions for teachers' professional learning (e.g., Bryk & Schneider, 2002, 2003; Seashore Louis, 2007; Tschannen-Moran, 2000, 2004; Wahlstrom & Louis, 2008). For example, trust is found to enhance the development of teachers' subject knowledge, pedagogic skills, and the teaching effectiveness necessary for changes and development in their classroom instruction (Cosner, 2009). It is through effective communication that principals provide sufficient support to enhance teachers' professional learning and ultimately achieve school and student improvement (e.g., Danielson, 2006; Tschannen-Moran, 2000). Equally important, collegial collaboration is also found to be an effective way of promoting teachers' professional learning (Quicke, 2000) for educational development and improvement (Hargreaves, 1994a, 1994b; Goddard, Goddard, & Tschannen-Moran, 2007). In general, the "interdependence of the relationships" (Caskey, 2010, p. 2) among school members plays a central role in building a professional learning community (Bryk & Schneider, 2003; Bryk, Camburn, & Louis, 1999; Hoy & Miskel, 2008; Tarter, Bliss, & Hoy, 1989; Wahlstrom & Louis, 2008).

Hoy, Tarter, and Hoy (2006) define trust as "one's vulnerability to another in terms of

the belief that the other will act in one's best interests" (p. 429). In a climate of mutual trust, positive organizational collegiality leads to the collective good of teaching effectiveness and student achievement, thereby benefiting the whole school (Bryk & Schneider, 2002, 2003; Fullan, 2000; Tschannen-Moran, 2000; Hoy & Miskel, 2008).

In school settings, communication is "the purposeful production and transmission" of messages between principals and staff (Gouran, Wiethoff, & Doelger, 1994, p. 6). Leadership begins with communication and values open dialogue. Gouran et al. (1994) underscore the important connection between communication and leadership when they recommend that leaders treat communication skills as the foundation of school activities. The extant literature also suggests that communication is the starting point for principals to support teacher learning and teaching (e.g., Danielson, 2006; Tschannen-Moran, 2000).

Although research on teacher collaboration began in the field of educational leadership two decades ago, the topic remains relatively unexplored (Lavie, 2006; Hargreaves, 1994a, 1994b), and the same is the case for the school capacity indicator of communication. However, Slater (2008) claims that the ability for cooperative work has become "one of the core requisites of contemporary school reform" (p. 324). Drawing on ample empirical evidence, Little (1982) asserts 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). In short, fostering collaboration is important for both building school capacity and promoting teacher performance.

Taken together, the intermediary targets of school initiatives, such as teachers' professional learning, are seldom linked to the effects of principal leadership, although some school-level human relational factors have been related to both principal leadership and teacher professional learning. Given the demonstrated importance of principals' relational competence, examination of the possible mediating effects of human relational factors on the relationship between teacher professional learning and principal leadership is likely to identify possible directions for developing principals' leadership qualities and building school capacity.

1.3 Hong Kong research corpus and gaps in the literature

Although the knowledge base underpinning conceptualizations of leadership and learning relies primarily on research studies conducted in Western contexts, it has had observable effects on the education policies adopted worldwide (e.g., Day et al., 2009; MacBeath & Cheng, 2008; Walker & Riordan, 2010). Indeed, recent years have seen a global consensus emerge among education policymakers concerning the central position of principals in the school improvement agenda. Hong Kong is no exception. Over the past few decades, policymakers have taken initiatives to enhance, support, and monitor principals' efforts to promote teaching effectiveness and student achievement (e.g., Hallinger & Lee, 2013; Pan & Chen, 2011; Walker, Hu, & Qian, 2012). Despite this policy trend, however, empirical research examining the nature and influence of principals' efforts in the turbulent context of the territory's educational changes and reforms contains many gaps (e.g., Hallinger & Bryant, 2013).

Echoing the global trend toward active educational changes and reforms, Hong Kong has entered a new era of school leadership in the 21st century (Cheng & Walker, 2008; Hallinger, 2011a, 2011b). Education reforms aimed at building more robust accountability structures and promoting school outcomes, in particular, have made changes to principal leadership an imperative (Davies, Ellison, & Bowring-Carr, 2005; Leithwood, 2001). However, the lack of a solid knowledge base for leadership improvement has been noted. In particular, the lack of a knowledge base for specific contexts may result in well-intentioned reforms leading to serious frustration and even failure or disaster (Cheng, Mok, & Tsui, 2002). It should be noted that "a sound knowledge base must be built upon a substantial set of high-quality, empirical studies" (Hallinger, Lee, & Szeto, 2013, p. 272; see also Bridges, 1982; Hallinger, 2011a; Hallinger & Bryant, 2013). In addition, although in Hong Kong the pressures on primary schools may be less intense than those on secondary schools, the need to examine policy prescriptions for leadership on the basis of empirical evidence applies equally to both sectors (Heck & Hallinger, 2009).

Although small in number, educational leadership studies originating in Hong Kong account for half of all research on the subject carried out in East Asia to date (Hallinger & Bryant, 2013). This accumulation of research output shows the gradual maturation and growing research capacity of Hong Kong researchers. Nevertheless, most of these studies have a limited focus and rarely address the key foci synergistically (Hallinger, Lee, & Szeto, 2013).

Many explorations of school leadership in Hong Kong are extracted from studies of school effectiveness carried out in the late 1980s and early 1990s. School leadership itself was not established as an area of research until relatively recently. Most Hong Kong-based school effectiveness and leadership studies are rooted in four large-scale, territory-wide investigations initiated in the 1990s and led by several universities. One of these investigations, led by scholars from the Chinese University of Hong Kong between 1991 and 1994, examines the effectiveness of the local secondary school system and identifies the effects of principals' instructional leadership on students' academic outcomes (Cheng, 2000; Kwok, Lo, Ng, & Cheng, 1997).

The main foci of research in this area include teacher effectiveness (e.g., Chan, Chan, Ngan, Cheung, & Yeung, 1992; Cheng, 1994a, 1996; Chui, Sharpe, & McCormick, 1996; Lee, Walker, & Chui, 2012; Tai & Cheng, 1994; Wong, 2010; Yu et al., 2002), school leadership (Chan & Cheng, 1993; Kwok, Lo, Ng, & Cheng, 1997; Shum & Cheng, 1997; Yuen & Cheng, 1991), school management (Cheng & Cheung, 1999; Cheng & Ng, 1994), and the school environment (e.g., Cheng, 1994b; Tam & Cheng, 1995, 1996; Yip, Lee, Tam, & Fung, 1992). Chan and Cheng (1993) report that teachers' professionalism is strongly related to principals' instructional leadership. Based on a large sample of 190 Hong Kong primary schools, Cheng's (1994b) multilevel study finds that strong principal leadership is related to positive principal-teacher relationships, higher levels of teacher professionalism, and positive student performance. Cheng (1996) further asserts that teachers' professionalism is affected by principal leadership and school formalization, which consequently affect students' affective educational outcomes. These investigations outline the general relationship among principal leadership, teacher professionalism, and student outcomes.

In Chinese societies such as Hong Kong, the academic-oriented expectations of all stakeholders render the policy environment rather complex. Investigations into the links between leadership and socio-cultural norms began in the 1990s (e.g., Bajunid, 1996; Hallinger, 1995; Hallinger & Leithwood, 1998). Most of these studies examine societal or cultural factors and their effects on a principal's attitudes and behavior toward school leadership and management (Dimmock & Walker, 2005; Ho & Tikly, 2012; Law, Galton, & Wan, 2010). For example, Yuen and Cheng (1991) highlight the moderating effects of several cultural and contextual characteristics of the school on the relationship between principal leadership behavior and teachers' organizational commitments. Cheng (2000) further concludes that Hong Kong principals are relatively weak in cultural dimensions when leading their schools. It was not until recently that scholars specifically examined how principals' leadership practices are influenced by the structure of the education system in Hong Kong's high-accountability policy context (Hallinger et al., 2013; Walker & Ko, 2011).

In the new millennium, such contextual factors as declining student enrolment and school closures are imposing new challenges on Hong Kong's education system (Hallinger, et al., 2013). In addition, schools are under increased pressure to be accountable, pressure that stems primarily from the quality assurance policies mandated by the government (Cheng, 2005; Cheng & Walker, 2008; Ho, 2010; Law, Galton, & Wan, 2007; Walker, 2004). To help schools to meet these accountability and contextual demands, there have been calls for "studies that examine policy prescriptions" for leadership on the basis of empirical evidence (Heck & Hallinger, 2009, p. 3). The projects led by Walker (2008-2010) in secondary schools and by Hallinger (2011-2013) in primary schools have responded to these calls.

These researchers and their colleagues find that two broad issues stand out within the shifting educational reform environment: the quality of principal leadership and school effects. For example, principal leadership in the area of instructional management is found to enhance students' academic achievement (Ko, Hallinger, & Walker, 2012), although teachers' professional classroom instruction contributes the most to what students learn in school (Walker & Ko, 2011). Walker and Ko's (2011) study exclusively examines the relationship between principal leadership and school

capacity. Although the effects of both have been addressed synergistically, these researchers are more interested in school improvement over time (Ko, Hallinger, & Walker, 2012; Lee, Walker, & Chui, 2012; Walker, Lee, & Bryant, 2014). Taken together, the output of these research efforts builds a solid knowledge base for policymakers and educational practitioners (e.g., Ko, Hallinger, & Walker, 2012, 2014; Lee, Hallinger, & Chui, 2013; Hallinger, Lee, & Ko, 2014; Walker, Lee, & Bryant, 2014).

In the face of ongoing educational reforms and the pressing accountability environment, most Hong Kong schools have retained a hierarchical structure typified by top-down bureaucracy. Despite calls for distributed leadership and teacher empowerment, the principal is still usually regarded as the sole leader to ensure quick decision-making. Through their frequent interactions with teachers, principals are also believed to exert an influence on teachers' instructional practices and the development of teacher professionalism (Louis et al., 2010; Witziers, Bosker, & Kruger, 2003).

In addition to developing the competencies needed to meet the increasing policy and accountability demands arising from external factors, principals also require the human competencies needed to ensure effective leadership and promote teachers' professionalization (Cheng, 2000; Wong, 2004). If not handled correctly, the tension between the centralizing tradition and current drive for decentralization in schools can hinder teachers' professional learning. At the same time, mere cosmetic empowerment will not effect real change (Hargreaves, 1995). It may result in teachers abusing their "workplace autonomy and discretion" (Pang, 2010, p. 352; see also Ingersoll, 1994).

In summary, it is of practical importance to outline how principal leadership can bind teachers together in professional learning in the Hong Kong context. Research into the nature and strength of the direct effects of principal leadership on teachers' professional learning and the indirect effects of such leadership through human relational factors can fill a gap in the existing Hong Kong-based research corpus. It is also vital to remember both the local societal and policy context when investigating the leadership effects on teacher learning.

1.4 Statement of the research problem

Compared to the influence of principal leadership on school capacity, the link between school capacity and teacher professional learning has drawn less attention in Hong Kong research, and the connections between the three have attracted even less (e.g., Ko, Hallinger, & Walker, 2012). For instance, recent local studies have investigated the principal leadership effects on school conditions in secondary schools and related them to school improvement (Walker, Lee, & Chui, 2012; Walker, Lee, & Bryant, 2014). There have rarely been inquiries into the effects of principal leadership on teacher professional learning through school capacity.

To fill this gap in the research, this study explores the mediated principal leadership effects on teacher professional learning through the relational school capacity factors of trust, communication, and collaboration. The potentially mediated path sets teacher professional learning as the distal variable, which is proposed to contribute to student outcomes and school improvement. Further exploration of mediated leadership efforts, in terms of the key qualities of good principalship in Hong Kong, on teacher professional learning provides additional insights into principals' leadership skills and competencies.

1.5 Aim and purpose of the study

The aim of this study is to develop an insightful understanding of how principal leadership affects teacher professional learning through the effects of school capacity that are related to human relations within the school. To achieve this aim, the study explores the nature and role of three human relation factors, trust, communication, and collaboration, through analysis of survey data collected from the teachers of 32 local primary schools in Hong Kong.

The major purpose of this comprehensive mediation study is twofold: to assess

whether human relation-related school capacity exerts mediating effects on the relationship between principal leadership and teacher professional learning, whether individually and jointly, and how the key qualities or core areas of principal leadership directly and indirectly affect teacher professional learning.

Conceptualizing school capacity as a mediator for improving teacher professional learning offers a "parsimonious way of interpreting how a long list of otherwise discreet factors may affect instruction" (Newmann et al., 2000, p. 261). The point of this study is not to create an overarching model that includes all school-level factors that influence teacher professional learning, but rather to target the human relational domains of school capacity that have not yet been explored in sufficient depth and breadth. It is hoped that the study's findings and insights can help Hong Kong schools to develop conditions conducive to sustainable teacher professionalization and school improvement.

1.6 Research questions, and hypothesis

To verify the potential mediating effects of the relational school capacity factors on the relationship between principal leadership and teacher professional learning, the following research questions are posed to frame the research design.

1. How are principal leadership, school capacity (i.e., trust, communication, and collaboration), and teacher professional learning related, as revealed by teachers' perceptions?

2. Is trust a mediator in the relationship between principal leadership and teacher professional learning?

3. Is communication a mediator in the relationship between principal leadership and teacher professional learning?

4. Is collaboration a mediator in the relationship between principal leadership and

teacher professional learning?

5. Do trust, communication, and collaboration have mediating effects on the relationship between principal leadership and teacher professional learning when jointly considered?

Hypothesis: Trust, communication, and collaboration have mediating effects on the relationship between principal leadership and teacher professional learning, both individually and jointly.

1.7 Significance of the study

This study makes three main contributions to the literature on educational leadership, school capacity, and teacher professional learning.

First, a review of the literature on principal leadership indicates that effective such leadership fosters school capacity and promotes teacher professional learning and classroom instruction (e.g., Bridges, 1967; Gross & Herriot, 1965; Hallinger & Murphy, 1985; Leithwood, Louis, Anderson, & Wahlstrom, 2004), a point that is reiterated in recent conceptualizations of leadership for learning (e.g., MacBeath & Cheng, 2008; Robinson, 2011; Spillane, Halverson, & Diamond, 2004). However, few studies have explored the effects of principal leadership on teacher professional learning through the mediating effects of school capacity factors. Even less examined are the effects of school-level factors relating to human relations such as trust, communication, and collaboration in the workplace.

Second, this study uses survey scales that originated in different educational contexts in Hong Kong, thereby shedding light on how leadership practices operate in the educational and socio-cultural contexts of Hong Kong (Belchetz & Leithwood, 2007). The principal leadership scale is taken from Kwan and Walker's (2008) study of vice-principalship in Hong Kong, which is itself extracted from educational documents on the key qualities expected of Hong Kong principals (ED, 2002b). The

school capacity scale is informed both by Leithwood and Jantzi's (2000) scale measuring principal leadership and school conditions and Walker and Ko's (2011) study targeting Hong Kong secondary schools. Accordingly, this localized study constitutes an in-depth exploration of Hong Kong primary schools. It provides evidence on the efficacy of principal's efforts to influence key school conditions that are proposed to directly affect teaching effectiveness, and thus has practical implications for local authorities and practitioners (e.g., Creemers & Kyriakides, 2008; Kyriakides et al., 2009). In addition, it also adds to the literature by contextualizing Western theories using data collected in Hong Kong.

Last but not least, this study identifies the mediated pathways or "mediating mechanism" through which school leadership affects teacher professional learning (Nir & Hameiri, 2014, p. 279; also see Hallinger & Heck, 1998; Leithwood et al., 2010). Methodologically, it employs classical four-step causal mediation analysis (Baron & Kenny, 1986) and conducts significance testing of the mediating effects using the bootstrapping method. Through step-wise inquiries, the study identifies the principal leadership effects on school capacity, the effects of school capacity on teacher professional learning, and the direct effect of principal leadership on teacher professional learning, as well as its indirect effects through school capacity. With evidence of the mediating effects, significance tests via the bootstrapping method are next conducted. Although widely used in other social science fields, most previous mediation studies in the educational arena rely solely on causal steps, making no efforts to test the significance of proven mediating effects. Even fewer integrate the bootstrapping method for more accurate estimation and potential inferences, and none attempts to satisfy the theoretical and practical criteria of mediator selection prior to mediation analysis. The current study, in contrast, sets these criteria as prerequisites, and proceeds only when they are met.

In sum, this study constitutes a detailed empirical examination of the mediated principal leadership effects on teacher professional learning in a non-Western cultural and institutional context. For researchers and educators interested in school effectiveness, a full understanding of such effectiveness must include the mediated

pathways or mediating mechanisms through which student achievement is influenced. In practical terms, principals are encouraged to adjust their practices to "institutionalize school-wide reform as vehicles" of leadership in a changing context (Klar & Brewer, 2013, p. 2). In addition to its substantive contributions to the educational leadership knowledge base, this mediation study also achieves a methodological breakthrough.

1.8 Definition of key terms

The key terms used throughout the thesis are defined in this section.

Change: a human "process that requires people to learn new technologies, practise new behaviors, and, ultimately, adopt new beliefs" (Evans, 1996, p. 15); variation across schools in relationships, meanings, norms, and values (Dalin, 1993).

Principal: the educational leader who "has formal and legislative responsibility as the chief administrator of a school, its students and staff" (Young, 2011, p. 22); the individual identified as the "chief building level administrator in the school charged with providing instructional leadership for the school assigned, and managerial operation of the school and property" (Turner, 2008, p. 13).

Leadership: "activities tied to the core work of the organization that are designed by organizational members to influence the motivation, knowledge, [and] practices of other organizational members, or that are understood by other organizational members as intended to influence their motivation, knowledge, or practice" (Spillane, 2006, p. 12-13); the "ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organization of which they are members" (House, Hanges, Javidan, Dorfman, & Gupta, 2004, p. 15).

Practices: routines that have "evolved as ways of solving frequently occurring practical problems" (Hutchins, 1995, p. 15); practices are "carried out by people interacting with each other and with relevant tools" (Robinson, 2011, p. 23).

The dimensions of principal leadership practices considered herein are based on the

six key qualities of principalship in Hong Kong proposed by Walker, Dimmock, Chan, Chan, Cheung, and Wong (2000). Kwan and Walker (2008) further develop these six key qualities into seven core areas for the measurement of vice principal leadership in Hong Kong.

As stipulated in a document developed for the Hong Kong Centre for the Development of Educational Leadership (also see ED, 2002a), the key qualities and "substantive areas or parameters of school leadership" (Walker et al., 2000, p. 5) are defined as follows. The six key qualities below are also referred to as six core areas, and later on seven core areas (see Note 2), of principal leadership.

1. Strategic Direction and Policy Environment

Principals, in concert with their school communities, develop a strategic vision for their schools as a means of guiding future direction and planning. That vision and their strategic plans incorporate those features of the social, political, and educational environments that are relevant to school improvement and student achievement.

2. Teaching, Learning, and Curriculum

Principals co-ordinate with teachers to achieve coherence across the curriculum and to ensure alignment between the curriculum and teaching and learning. Together with their school communities, they ensure that all students experience a broad, balanced, and relevant curriculum through formal, informal, and extracurricular activities.

3. Teacher Growth and Development

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.

4. Staff and Resource Management[2]

Principals create a collaborative team management ethos focused on using human, physical, and fiscal resources effectively and efficiently to achieve school and student improvement.

5. Quality Assurance and Accountability

In concert with their school communities, principals build quality assurance and accountability systems that provide feedback to students, teachers, school management committees, and sponsoring bodies with a view to securing school improvements. These systems also meet the information requirements of external agencies such as the government regarding school performance.

6. External Communication and Connection

Principals build connections between their schools and the local, national, and global communities. By doing so, they enable their school communities to contribute to the wider society and its development.

School Capacity: a "collection of organizational resources, interactive in nature, which supports school-wide reform work, teacher change, and ultimately the improvement of student learning" (Cosner, 2009, p. 250). School capacity includes the "knowledge, skills, and dispositions of individual staff members" (Newmann et al., 2000, p. 263).

Relational School Capacity: school capacity that "creates a set of relationships, norms of behaviors, values, and obligations that lead to the development of healthy and productive adults, including measure[s] of trust, communication, and collaboration one is involved at [the] workplace" (Newell & Van Ryzin, 2007, p. 468).

Trust: "an individual's or group's willingness to be vulnerable to another party based on the confidence that the latter party is benevolent, reliable, competent, honest, and open" (Hoy & Tschannen-Moran, 1999, p. 189); "One party's willingness to be vulnerable to another party based on the belief that the latter party is 1) competent, 2) open, 3) concerned, and 4) reliable" (Mishra, 1996, p. 5).

[2] This key quality is split into *Staff Management* and *Resource Management* in Walker and Kwan (2008) as two of the seven core areas of generic principal leadership practices

Communication: the "purposeful production and transmission of messages between people" (Gouran, Wiethoff, & Doelger, 1994, p. 6). At the organizational level, communication is the "process whereby people within an organization give and receive message[s]" (Tourani & Rast, 2012, p. 52; see also Dwyer, 2005).

Collaboration: a style of "direct interaction between at least two co-equal parties voluntarily engaged in shared decision making as they work toward a common goal" (Friend & Cook, 1992, p. 5).

Teacher Development: "processes and activities designed to enhance the professional knowledge, skills, and attitudes of teachers so that they might, in turn, improve the learning of students" (Guskey, 2000, p. 16).

Teacher Professional Learning: a "product of both externally-provided and job-embedded activities that increase teachers' knowledge and change their instructional practice in ways that support student learning" (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009, p. 1).

Mediator: a variable may be called a mediator "to the extent that it accounts for the relation between the predictor and the criterion" (Baron & Kenny, 1986, p. 1176).

1.9 Organization of the thesis

This thesis is organized into five chapters. Chapter One provides an overview of the study. It begins with an introduction to the changing Hong Kong educational context and the frontiers of research in the field of educational leadership both globally and locally, then proceeds to a statement of the research problem and the aims and purpose of the study, followed by presentation of the research questions and theory-grounded hypotheses, a discussion of the study's significance, and definitions of key terms.

Chapter Two starts with a systematic literature review and discussion of the study's key variables. The theme of educational change is introduced to set the backdrop for the study. The literature review covers studies that contribute to the conceptual underpinnings of and empirical output in the area of school leadership and

effectiveness (Hallinger, 2012). Next, the conceptual framework guiding the inquiry into the mediated principal leadership effects on teacher professional learning is presented. The overall aim of the second chapter is to identify the educative importance of human relations in the mediated relationship between principal leadership and teacher professional learning.

Chapter Three explains the research design, including the data collection procedures, profiles of the school and teacher samples, instrumentation, and scale validation procedures. The data collection procedures and ethical issues are also discussed, and the chapter concludes with a brief introduction to the analytical framework.

Chapter Four begins by presenting demographic information on the samples, and then discusses the results of the descriptive and comparative analyses revealing the interrelatedness of principal leadership, school capacity, and teacher professional learning, as perceived by the participating teachers. The chapter then moves on to the mediation analyses. This study followed Kenny and Baron's (1986) causal steps process in assessing whether principal leadership is linked directly, and indirectly though human relational factors, to teacher professional learning in Hong Kong. After initial assessment of the presence of mediating effects, the significance and strength of these effects were tested, and the effect sizes specified and compared. The results of these analyses and statistical analyses are presented and interpreted.

Chapter Five concludes the thesis by summarizing the main findings in line with the research questions, followed by in-depth discussion and interpretation. The final chapter also discusses the study's implications for practice and policy, makes recommendations for future research, and addresses the study's limitations before concluding with a summary.

CHAPTER 2
THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Introduction

This chapter, which contains five sections, reviews the literature to establish and justify the conceptual framework (Bryant, 2011) guiding the study. The first section draws upon the literature on educational change to illustrate the macro-level theoretical and contextual backdrop. The second reviews the theoretical and empirical literature relating to principal leadership as both a unitary and generic construct and the core areas of principals' leadership practice. The focus of the third section is the literature on school capacity. This section also includes a more specific theoretical and empirical review of the key components of such capacity, i.e., trust, communication, and collaboration. These factors are connected, more generally, to human relations and social capital in schools. A review of the teacher professional learning literature is conducted in the fourth section based on the proposition that such learning is affected by two groups of factors: those involving the principal as the school leader and those connected with the school's human relational capacity. Section five concludes the chapter with a presentation of the overall conceptual framework guiding the study, which draws upon the aforementioned proposition and support from the extant research.

2.1 Educational change

This section reviews the literature on educational change to set the backdrop to the study.

Educational change does not occur in a castle in the air. The innovative antecedents

leading to change can be attributed to "socio-historical contexts, institutional politics and individual personalities" (Bryant, 2011, p. 9; see also Alderson, 2009). Early rational-linear theory conceptualizes change as a process taking place in a linear approach that is implemented from top to bottom (Fullan, 2005). In the education context, principals and teachers as end users apply innovative measures that are predesigned to meet objectives preset by the authorities while providing guidance, supervision, mentoring, and evaluation where possible. In brief, policymakers "control the organizational, political and technical process[es] that affect implementation" (Datnow & Park, 2009, p. 348). Despite policymakers initiating and designing innovation, in practice it is the end users who act as authentic change agents and who make real changes happen. In this outcome-based change conceptualization, any setbacks and unexpected occurrences are viewed as problems or failures (Bryant, 2011).

Given the multiple layers of change and the various processes by which it occurs, advocates of the ecological model of sustainability use complex theory to explain change (Haggis, 2007b; Mason, 2008; Radford, 2008). From this perspective, change is viewed as an iterative process that is adaptive (Stacey, 1996), "organic, non-linear and holistic" (Morrison, 2008, pp. 19-20), and rooted in a complex and dynamic context. In this sense, problems or failures are not regarded as leading to a dead end, and therefore prevented from occurring. Instead, they are the consequence of "mutual adaptation" (Berman, Greenwood, McLaughlin, & Pincus, 1975, p. 8). In practice, end users have a certain amount of autonomy to adapt innovations in alignment with local needs. The key point is that "the single most important factor in any change process is the people who will be most affected by the change" (Hord, Rutherford, Hulling-Austin & Hall, 1987, p. 29). After all, change is a human "process that requires people to learn new technologies, practice new behaviours, and, ultimately, adopt new beliefs" (Evans, 1996, p. 15).

Given the complex "inter- and intro-relationships among macro-contextual and micro-cultural factors," the authorities often endorse change agents who do not necessarily play their roles well (Bryant, 2011, p. 14). Change agents do not have to be the end users of an innovation, i.e., the principals and teachers at the frontline in our

context. Whoever they may be, to initiate and lead real change, agents should have tailor-made training and network support in addition to human relational competence and specific context knowledge (Rust, Ely, Krashnow, & Miller, 2001). More narrowly, change efforts should be school-specific and school-based, which provides the rationale for the SBM and school-based curricula that have been prevalent during the most recent wave of worldwide educational reforms.

At the individual school level, principals are in the leading position to introduce and oversee school-based changes through multiple approaches. In the following section, the literature on principal leadership, as both a unitary conceptual and array of core practices, is reviewed. One purpose of this review is to position principals in the changing educational context. Another is to examine how changes in principal practices reflect the changes in that context and are affected by them. Pashiardis, Kafa, and Marmara (2012) claim that the quality of principal leadership is "mainly measured through evidence on school improvement over time" (p. 481). As a result of policy changes, changes in principal practices inevitably lead to changes in school capacity and, eventually, to changes in teaching and learning.

2.2 Principal leadership in a changing context

Defining principal leadership

Recent research suggests that principal leadership may be the most important factor in school improvement, accounting for about one-fourth of overall school outcomes (Day et al., 2009; Gurr, Drysdale, Swann, Doherty, Ford, & Goode, 2005; Leithwood & Riehl, 2003). Given the generally agreed importance of leadership, there is a surprising lack of consensus on its definition (Leithwood Jantzi, & Steinbach, 1999). In the many and varied definitions of leadership, the basic idea is a process of influence (Cuban, 1988; Leithwood & Riehl, 2003). Bush and Glover (2003) further claim that that process is purposeful due to the intention to achieve specific outcomes. For Spillane and

colleagues (2004, 2006, 2007), it is the intention more than the actual influence that characterizes leadership. In this sense, leadership comprises

> activities tied to the core work of the organization that are designed by organizational members to influence the motivation, knowledge, affect or practices of other organizational members, or that are understood by other organizational members as intended to influence their motivation, knowledge, affect or practice (Spillane, 2006, pp. 11-12).

House et al. (2004) claim their definition to be a global one, regarding leadership as "the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organization of which they are members" (p. 15). Therefore, leadership can be assumed by anybody in the organization. It is "something that flows throughout an organization, spanning levels and flowing both up and down hierarchies" (Bush & Glover, 2003, p. 4).

Yukl (2002) synthesizes a variety of theories, and identifies the commonalities of leadership as comprising a process that occurs between the leaders and followers within a group working to attain a particular goal, with influence occurring as part of that process. Fidler (1997) reinforces Yukl's (2002, p. 25) notion by asserting that followers are "influenced towards goal achievement". In this sense, leaders are "people who bend the motivations and actions of others to achieving certain goals," and leadership implies taking risks (Bush & Glover, 2003, p. 4).

In sum, leaders are not necessarily those who are formally appointed to a hierarchically defined position. A leader can be anyone in the group who provides direction and exercises influence and who has the ability or intention to motivate or enable others in the process of influence. This definition also holds true in educational organizations such as schools, where the principal has the formal authority but leadership functions are normally shared across staff members.

Investigating principal leadership

There has been a wealth of scholarly research on principal leadership in the past few decades. Prior investigations of educational leadership in effective schools focus primarily on the practices or behavior of principals (Duke, 2010), drawing on the underlying assumption that "there is a set of behaviours, beliefs and affects that can be described as leadership and that can be attributed to [a] principal" (Gurr, 1996, p. 19). Leithwood and Riehl (2003) assert that "a core set of leadership practices forming the basics of successful leadership [is] valuable in almost all educational contexts" (p. 5). Belchetz and Leithwood (2007) concur, further noting that the core set of leadership practices must be adapted to the needs, constraints, and opportunities of different socio-cultural and organizational contexts, and thus be conducive to change.

Similarly, Duke (2010) points out the necessity for principals to implement their leadership power and change their practices according to the specific challenges their schools face. He further argues that there is no best way to lead a school. Rather, the school type and specific situation it faces must be considered (see also Harris, 2002). Therefore, when investigating principal leadership, the context must be emphasized, which may explain why recent state-of-the-art scholarship in the educational leadership arena is engaged in testing, elaborating, and extending these assertions in various contexts (Hallinger & Lee, 2014; Opdenakker & van Damme, 2007; Scheerens, 2012; Sebastian & Allensworth, 2012).

Despite Duke's (2010) doubts about the evidence of generic leadership skills and competencies that are applicable to schools facing a range of challenges and situations, a large number of international studies focus on effective generic principal leadership practices. For example, Day et al. (2009) extract four common core practices of principal leadership from the cumulative literature on school leadership: setting the direction, developing people, redesigning the organization, and managing an instructional teaching and learning program. They propose that these core leadership practices describe successful school leadership across a broad set of organizational contexts, and thus constitute a universal pool of good principal leadership practices that are applicable to all education contexts. Leithwood et al. (2010) recently adopted this model in empirical research that partially validated the

proposition put forward by Day et al. (2009).

In addition to the aforementioned set of four core leadership practices, the International Successful School Principalship Project (ISSPP) also found successful principals to be good at ensuring a "physically and emotionally safe environment," clearly articulating core values, constructing "context-sensitive improvement plans," establishing trust progressively, being "visible in school," influencing teaching and learning, and working "collaboratively in the broader context to develop new opportunities for students" (National College for Leadership of Schools and Children's Services [NCLSCS], 2010, p. 4). The project, initiated by Prof. Christopher Day of the University of Nottingham, initially began with eight countries and was eventually expanded to include another six.

The purpose of the ISSPP was to identify, through multiple case studies, the good practices of successful principals in a variety of contexts in the participating countries (Klar & Brewer, 2013). Hence, the frameworks for successful principal leadership may differ by country. For example, the Australian model is a three-level school leadership framework investigating the influence of contextual factors on teaching and learning via school capacity (NCLSCS, 2010). The Australian team involved in the project also examined how principals approach change with "context-sensitive strategies" within their schools (NCLSCS, 2010, p. 8). Of the common characteristics involved in leading change through an emotional process, the establishment of core values and a school vision and two-way trust stand out.

Joining the ISSPP at a later data, Pashiardis, Savvides, Lytra, and Angelidou (2011) conducted multiple case studies in Cyprus. On the basis of their findings, they propose a model of four domains of practice for successful school leadership based on both system- and school-level contextual variables. In addition to taking the context in which principals work into account in their model, they also integrate the values "underpinning the school as an institution in society" (Pashiardis et al., 2011, p. 3; see also Dimmock & Walker, 2000; Klar & Brewer, 2013). In a subsequent study, Pashiardis, Kafa, and Marmara (2012) further develop the aforementioned four-component model to encompass the common features of leadership action and behavior. The four components are developing external relations, having a clear

vision, creating collaborative learning and an instructional environment, and having shared ownership and passionate commitment. Within these individual domains, there are a number of observed principal practices and professional (e.g., setting high goals and expectations) and personal characteristics (e.g., trust, vision, and beliefs).

In investigating the multifaceted nature of principal leadership, unitary concepts of leadership are today seldom employed (Dupont, 2009). Most researchers use leadership models from which leadership components are derived (Ogawa & Hart, 1985). Research syntheses conducted over the past 15 years have also identified conceptual models that are more comprehensive than those proposed earlier, and it is now widely accepted that conceptual models of school leadership must incorporate practices that concentrate on both teaching and learning (e.g., Hallinger & Murphy, 1985; Leithwood, Mascall, & Strauss, 2008; Robinson et al., 2008) and the school climate (e.g., Leithwood & Sun, 2012).

For instance, Goldring, Porter, Murphy, Elliott, and Cravens (2007, 2009) conceptualize leadership as comprising six core components and six key processes that interact in a complex reality. The core components are extracted from school characteristics that enhance teaching quality and student learning (namely, high standards for student learning, rigorous curriculum, quality instruction, culture of learning and professional behavior, connections to external communities, and systemic performance accountability), and the key processes include planning, implementing, supporting, advocating, communicating, and monitoring (see also Goldring et al., 2007, 2009; Porter, Goldring, Murphy, Elliott, & Cravens, 2006). The interaction of these core components and key processes constitutes the dynamic interrelationships formed during the process of school leadership.

To narrow down the scope of principal leadership, Spillane (2006) argues that it should focus on activities that are related to the core work of schooling and that are understood by school members "as intended to influence their motivation, knowledge, affect or practice" (pp. 11-12). To provide a "convenient and manageable way of encapsulating school leadership," as Walker and Dimmock (2002, p. 72) put it, Walker and Ko (2011) propose seven core areas of leadership practices extracted from the six key qualities of principalship in Hong Kong (ED, 2002b). This

dimensional structure is informed by Leithwood and Jantzi's (2000) conceptual model and adapted to reflect the Hong Kong institutional context. These six qualities are strategic direction and policy environment; teaching, learning, and curriculum; teacher growth and development; staff management and resource management; quality assurance and accountability; and external communication and connections.

Although less than comprehensive, Walker and Ko's (2011) seven core areas of principal leadership practices, which are of an earlier version of the seven core areas used in the present study, cover the fundamental operational foci of principalship in Hong Kong. More importantly, they propose a hierarchical structure based on the priority and relevance of leadership practices in the context of increasing accountability. Considering the pressing educational environment in Hong Kong, Walker and Ko (2011) claim that principal leadership responding to strategic direction and quality assurance determines or strongly influences the priorities of a principal's work in the school, meaning that the stakes are high. Principals' emphasis on teacher learning and development is a response to local education policies and the practical needs of parents and students. Because the administrative work related to staff and resource capacity and staff management are a means but not an end to a principal's work and educational objectives, it is peripheral.

In the following paragraphs, the literature on core principal leadership practices is reviewed. Leadership can be categorized into three leadership typologies, each involving distinct core practices: instructional leadership (teaching, learning, and curriculum), transformational leadership (teacher development, strategic direction, and accountability management), and managerial leadership (staff management, resource management, and external communication). However, no attempt is made here to categorize generic principal practices into these three typologies. The core practices represent key operational areas of leadership and are viewed as individual dimensions of principal leadership practice.

2.2.1 Strategic direction

In the circumstances of the rapid educational and contextual changes that Hong Kong has seen in the past few decades, school principals are expected to build a school vision and lead strategically (Cheng, 2011; Davies, Ellison, & Bowring-Carr, 2005; Leithwood, 2001). Strategic direction entails ensuring that the internal and external environments of the school are well integrated. Accordingly, principals are expected to use school goals to reinforce system goals, establish school-level priorities, and influence staff activities. In a narrow sense, strategic direction is manifested as the observable behavior of principals. In a broad sense, their observable behavior accounts for the notion of visionary leadership (Foreman, 1998; Fullan, 1992).

The notion of visionary leadership indicates that principals lead through a process of influence on teachers and students that is aimed at achieving desired purposes and a shared vision (Bush & Glover, 2003; Leithwood & Riehl, 2003). These purposes and vision can be based on the policy climate and/or principals' personal values. For principals, the purpose of a successful strategic direction is to "communicate or articulate their vision to colleagues and to ensure that its influence permeate[s] every aspect of organizational life" (Bolam, McMahon, Pocklington, & Weindling, 1993, p. 36). Without effective communication, emphasis on vision and goals in school leadership becomes meaningless or even misleading. Rendering the dynamic process of a strategic direction or visionary leadership sustainable requires effective communication and extra effort and capacity on the part of principals (Fullan, 1992). In addition, principals themselves must be sufficiently confident and comfortable to inspire staff to achieve their desired goals and vision (Kouzes & Posner, 1996).

In a highly centralized educational context such as Hong Kong's, the achievement of goals and vision is often led by the principal and implemented in a top-down manner. It should be noted that inappropriate strategic implementation may hinder the attainment of a principal's vision and goals, and, even worse, visionary leaders may unintentionally damage rather than improve their schools (Bush & Glover, 2003), particularly when the vision and goals are impractical and do not permeate every aspect of school life.

With regard to principals' visionary leadership at the school level, studies carried out in different countries offer conflicting evidence. For example, their study of 1,769

teachers from 62 U.S. schools leads Greenfield, Licata, and Johnson (1992) to conclude that principals' vision in most schools is clearly articulated and effectively advanced. In contrast, in their study of 12 schools in England and Wales, Bolam et al. (1993) find the teachers in only four able to recall their school vision to any meaningful extent. Indeed, most of the participating principals were unable to illustrate a vision specific to their school. Instead, most articulated a vision in line with the general British education system (Bolam et al., 1993).

Even when specifically articulated, vision can blind principals in various ways. For example, principals may be misled by their own vision when they shape or change the school culture and expect teachers to match that vision (Fullan, 1992). Approaches have to be democratic and gradual if positive change is to occur. In addition, the school ethos and teachers' working styles have to be taken into consideration. Working with a shared vision offers both principals and teachers the possibility of finding sustained meaning in and enhancing commitment to their work (Donaldson, 2001; Hallinger, 2003). That shared vision should be strategically directed and implemented, and should also embrace a set of measurable goals and behavior while emphasizing that the underlying purpose of education is student growth (Barth, 1990; Kantabutra, 2005).

2.2.2 Quality insurance

The demands of quality education over the past few decades have led to a shift from instructional leadership to transformative leadership (Murphy & Hallinger, 1992). As a result, the design of teaching and learning activities is often oriented toward accountability, particularly in a policy climate such as Hong Kong's that heavily emphasizes accountability. Walker and Ko (2011) state that, of the core areas of principal leadership, quality assurance is essential to principals and teachers in Hong Kong schools, who are held accountable for school improvement.

The demanding and pervasive system of school-level accountability has reshaped principal practices over the past decade (Ko, Hallinger, & Walker, 2012). Principals

have to go an extra mile to respond to a range of pressing contextual demands and parental expectations, and prioritize their practices accordingly (Cheng & Wong, 1996; Harris, 2002; Klar & Brewer, 2013; Ruebling, Kayona, & Clarke, 2004). This situation has both increased the pressure on principals to play a more hands-on role and limited their discretion over the procedures they choose to manage and monitor teaching and learning processes.

Walker and Ko's (2011) study of Hong Kong secondary schools incorporates and emphasizes some of the key aspects of the accountability system. They propose that principal leadership in the area of quality assurance determines or strongly influences the priorities of a principal's work within the school, and thus the stakes are high. In practice, it is recommended that principals integrate the requirements of the internal and external environment constructively. The requirements of the external environment are related primarily to quality assurance and enhancement, which are manipulated by the authorities.

Despite facing a less stressful public accountability environment than secondary schools, Hong Kong's primary schools do face the challenges of a changing policy environment. As evidenced in Cheng's (1994a, 2005) studies of Hong Kong primary schools, principal leadership practices typically interact with the school culture and local educational context. In fact, the highly centralized, directed, and controlled Hong Kong education system has "dramatically reduced the possibility of realizing … genuinely transformational education and leadership" (Bottery, 2001, p. 215).

2.2.3 Teacher development

To avoid confusion with the concept "teacher professional learning," which stresses teachers' collective learning to enhance professionalism, the concept "teacher professional development" is termed "teacher development" in this thesis. With emphasis on a principal's organization of and involvement in teachers' professional development activities, and the coaching and mentoring role he or she plays, the term

is used in its broad sense.

Scholars have proposed that principal leadership addresses school capacity more thoroughly when teacher development is placed at the center of the school (Youngs, 2002). In addressing teacher development, the targets should be the school's central activities, that is, teaching and learning (Bush & Glover, 2003). As previously noted, teacher development has been conceptualized and validated as a key channel through which school principals influence the teaching and learning processes (Leithwood et al., 2008; Robinson et al., 2008). In addition, the teacher development experience is more likely to enhance school effects if it addresses both teachers' professional learning and the school's context and capacity. For example, Youngs and King (2002) show that teacher development is an essential pathway for principals to shape school conditions, build school capacity, and influence teaching effectiveness.

Teacher development generally refers to teachers' development of their professional role (Villegas-Reimers, 2003). Guskey (2000) claims that professional development encompasses 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). Educators in his study include principals, administrators, and teachers.

For the professional development of all school members, the intense development of teachers has been identified as a necessary condition to ensure school effectiveness (Daresh, 1998; Fullan, 2001). Professional development is vital for teachers to grow professionally. After all, the ultimate goal of teacher development is to improve teachers' ability to provide effective instruction. Therefore, principals have a responsibility to ensure that teachers have professional development opportunities.

To provide effective leadership for learning, principals should also involve themselves in teachers' professional growth and development experience. They must take the lead in teacher development and guide teachers' professional learning at the school level (DuFour, 1998). In the Principals' Continuing Professional Development Framework established by the ED (2002b), principal leadership is related to teacher professional development, as the following excerpt makes clear.

> 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).

In sum, principal leadership of teacher development is regarded as "an essential mechanism for deepening teachers' content knowledge and developing their teaching practices" (Desimone, Smith, & Ueno, 2006, p. 181). However, effective and subject knowledge-centered professional development experience may not serve teachers of differing knowledge bases and levels of teaching experience equally well. Therefore, teacher development programs need to be of high academic quality and be scaffolded to match different levels of teacher expertise. For example, in their study of primary school mathematics teachers, Desimone et al. (2006) report that those with the strongest subject knowledge and higher levels of preparation benefit most from professional development.

2.2.4 Instructional leadership

Principals' instructional leadership is considered vital to achieving the ultimate goal of education, that is, teaching and learning (Hallinger & Lee, 2013). As a form of leadership for learning, instructional leadership is strongly and directly related to teaching and learning in schools (Bush & Glover, 2003; Sheppard, 1996; Southworth, 2002), and accordingly has drawn the attention of researchers interested in educational leadership for the past 50 years (e.g., Bossert et al., 1982; Bridges, 1967; Hallinger & Murphy, 1985). Indeed, most school leadership theory is "rooted in instructional leadership theory developed during the 1980s and 1990s" (Dupont, 2009, p. 17). Grounded in school effectiveness and management research, instructional leadership maintains that principal leadership must be instructionally focused (Gurr, 1996; National College for School Leadership, 2001).

Hallinger and Murphy's (1985) framework, which laid the foundation for

instructional leadership, has become the most extensively used scale in the field of educational leadership. The framework's dimension of *Defining the Mission* comprises the key instructional leadership functions of "framing goals" and "communicating goals," whereas *Managing Curriculum and Instruction* (C&I) includes four functions: "knowing C&I," "coordinating the curriculum," "supervising and evaluating," and "monitoring progress." Its third and final dimension, *Promoting School Climate*, includes the functions of "setting standards," "setting expectations," "protecting time," and "promoting improvement."

Blasé and Blasé (1998) examine the behavior of principals in a number of U.S. schools and advocate three strategies for effectively improving teaching and learning: talking with teachers (conferencing), promoting teachers' professional growth, and fostering teacher reflection. Southworth's (2002) qualitative investigation of primary school headmasters in England and Wales reveals that effective instructional leadership should incorporate three components: modeling, monitoring, and professional dialogue and discussion. The studies of Southworth (2002) and Blasé and Blasé (1998) are in agreement with regard to teacher professional development. They both regard such development as a key aspect of instructional learning or effective means of promoting it.

Scholars' attention has more recently turned to transformational and distributed leadership (e.g., Spillane, 2006; Spillane, Camburn, & Pareja, 2007), although research interest in instructional leadership has not diminished. In response to calls for greater educational accountability and quality assurance in recent years, researchers in the field of educational leadership have begun to focus on examining the links between principal leadership and school improvement (Hallinger, 2012). For example, Louis et al. (2010) claim that effective principal instructional leadership strengthens teacher professional learning and that, in schools, teachers' professional learning is "directly responsible for the learning of students" (p. 37).

Of the series of research projects on educational leadership commissioned by the Wallace Foundation, the study conducted by RAND Education on cohesive leadership systems (CLS) specifically examined principals' ability to improve instructional leadership in a well-coordinated policy context (Augustine et al., 2009).

The study's purpose was to identify effective approaches and contextual conditions that enhance principals' ability to practice instructional leadership. Its findings reveal the possibility of and strategies for constructing a CLS that tends to develop principals' instructional leadership skills. These strategies include building trust, fostering communication, and building capacity for the work in question.

A Wallace Foundation project jointly conducted by the University of Minnesota and University of Toronto probes the leadership forces at the school, district, and state levels (Seashore Louis et al., 2010) in a mixed-methods study involving both primary and secondary schools. The authors reinforce the view that principals' capacity to have "deep understanding of curricular content and instructional materials" may work well in primary schools (Seashore Louis et al., 2010, p. 40), whereas principals in secondary schools are more likely to provide support for the improvement of teacher instruction. The study considers both principals' direct instructional coaching and their supportive behavior. Its findings suggest that the leadership practices most instructionally helpful are focusing the school on goals and expectations for student achievement, keeping track of teachers' professional development needs, and creating structures and opportunities for teachers to collaborate (Seashore Louis et al., 2010).

Another study commissioned by the Wallace Foundation and led by researchers from the University of Washington (Knapp, Copland, Honig, Plecki, & Portin, 2010) recommends that instructional support be provided to all teachers, novice teachers in particular, by those who offer instructional leadership in schools. The researchers define instructional leadership as "intentional efforts at all levels of an educational system to guide, direct, or support teachers as they seek to increase their repertoire of skills, gain professional knowledge, and ultimately improve their students' success" (Knapp et al., 2010, p. 5) Therefore, they advice district, central office, state, and federal departments to support principals in a way that helps them to develop strong instructional leadership capacity. At the same time, principals are also encouraged to raise instructional improvement issues to optimally support teacher instruction.

2.2.5 External communication and staff and resource management

In contrast with instructional leadership and teacher development leadership, managerial leadership is little emphasized in principalship research. In Hallinger's (2003) leadership model, the management practices of principals have a much weaker effect on school improvement than does dedicated instructional leadership. Similarly, Walker and Ko (2011) maintain that principals' management work with regard to staff, resources, and external communication is a means rather than an end to achieving educational objectives, and is therefore peripheral.

Walker and Ko's (2011) proposition does not contradict the boundary-spanning role of principals that has long been acknowledged as key to building and sustaining support for schools in their communities and within the administrative structure of the school district (Bossert et al., 1982; Goldring & Pasternak, 1994; Kruse, 2001). Principals who fail to develop and maintain robust external communication channels run the risk of losing both political and resource support for their efforts inside the school (Cuban, 1988; Leithwood et al., 2010; Leithwood & Riehl, 2003).

Further, principals have a major influence over how school resources are obtained and managed (Bossert et al., 1982; Cuban, 1988). They have different capacities for gaining access to resources, channeling them toward different priorities, and employing them with different degrees of efficiency and fairness. Resource management highlights practices concerned with obtaining and using resources to directly benefit teaching and learning.

A key, although sensitive, aspect of the task and functions of managerial leadership is staff management. The global educational reform trend that has gathered pace over the past decade is the use of performance management tools such as the 360 appraisal system in education. The performance evaluation toolkits available in contemporary educational settings include the use of a wider range of rewards and incentives and the more systematic application of teacher evaluation methods (Hallinger & Lee, 2013). The intention is to motivate teachers and enhance their competence.

Responding to government stress on performance and public accountability and the

global fashion for the professionalization of education leadership Bush and Glover (2003identify 33 leadership and management tasks and categorize them into five key areas of principalship: the strategic direction and development of the school; teaching and learning; leading and managing staff; the effective and efficient deployment of staff and resources; and accountability. These key areas inform the standards for the National Professional Qualification for Headship (NPQH) in England and Wales. In contrast to Hallinger and Murphy's (1985) emphasis on instructional leadership, the NPQH standards place greater emphasis on the tasks and functions of transformational and managerial leadership.

Despite managerial functions being regarded as the basic components of successful leadership, they are prone to be limited and technical (Hallinger, 1992). However, when translating system accountability into school-level requirements, principals must make a delicate balancing effort to reduce teacher resistance. Their leadership skills and competencies are advantages at this point. Through well-structured managerial arrangements such as reward systems, principals can maintain an ongoing focus on teaching and learning work (Waters, Marzano, & McNulty, 2003).

As a consequence of educational changes, principals' leadership efforts have also had to change over time. Changes in their leadership practices have emerged over time through the "interrelationship among context, policy initiatives and other educational innovations" (Bryant, 2011, abstract, para. 5). Innovations initiated by local policymakers may be introduced from Western societies and implemented at the school level by frontline insiders. Therefore, the changing process of principal leadership is somehow the result of multiple adaptation and compromise.

In sum, the conceptualization of leadership in a dimensional framework has been a feature of educational leadership research in recent years. Investigation into the multiple foci of principal leadership is an extension and enrichment of the unitary concept of leadership. At the same time, studies of principal leadership typically rely on teachers' or principals' estimates or perceptions rather than on the direct observation of principals' behavior (Dupont, 2009). Theoretically, most educational leadership studies examine the sources or effects of principal leadership on student learning (Leithwood & Day, 2007), with few using distal variables other than student

outcomes and school improvement. Studies addressing the changing effects of principal leadership over school-level factors on intermediary variables are even rarer.

In addition to top-down change efforts that are rendered effective through institutional structuring (Dalin, 1998), real change at the school level is likely to occur more naturally through the construction of human resources and relations. Principal efforts that function in this way include establishing teacher professional learning communities (Bodilly, Chun, Ikemoto, & Stockley, 2004; Hipp, Huffman, Pankake, & Olivier, 2008), building school capacity through teacher collaboration (Ellsworth, 2000; Little, 2002), distributing leadership and empowering teachers (Harris, 2001; Harris, Leithwood, Day, Sammons, & Hopkins, 2007), and building social capacity and capital (Harris et al., 2007; Richert, Stoddard, & Kass, 2001) in the change process. The following section reviews the school capacity literature and considers the role of the three human relation indicators of interest in this study, i.e., trust, communication, and collaboration.

Principals are undoubtedly in a position to lead changes, which are in turn reflected as changes in their leadership behavior. Teachers, however, are expected to be ready for change, which is often not the case in real life. Bearing in mind the autonomous and isolating nature of the teaching profession, principals need to find ways to encourage teachers to accept and appreciate the changes that have been introduced. A workable way of doing so is to reduce or eliminate teachers' resistance to changes in principals' leadership practices by building human relations and a good workplace environment. After all, as educational stakeholders, the target of both principals and teachers is improved teaching effectiveness and student achievement.

2.3 School capacity

Defining school capacity

The term "school capacity" is often used loosely, with a variety of definitions found

in the literature on organizational change and school reform. The broader term "school conditions" is often used in earlier research, referring to the "policies and practices concerning the school's structure, culture, instructional services and human resources" (Leithwood et al., 2004, p. 51). As school capacity is a more specific concept, its underpinnings are narrower than the more general school conditions, although there is some degree of overlap. The former term places greater emphasis on the dynamics of the school for sustainable development.

Used on its own, "capacity" often refers to the "potential of material, a product, person or group to fulfill a function if it is used in a particular way" (Newman, 2001, p. 3). Youngs and King (2002) assert that all key school factors that affect school improvement should be regarded as school capacity. Cosner (2009) sees school capacity as "a collection of organizational resources, interactive in nature, that supports schoolwide reform work, teacher change, and ultimately the improvement of student learning" (p. 250).

Newmann et al. (2000) summarize definitions of school capacity as "the collective power of the full staff to improve student achievement schoolwide" (p. 261). They posit that school capacity varies from one school to another, with each school featuring a "unique mix of many teachers' and students' competencies and attitudes" and different social and political conditions (Newmann et al., 2000, p. 3; see also Bryk, Sebring, Kerbow, Rollow, & Easton, 1998; Louis & Miles, 1990). Both factors affect how teachers interact with one another and with students. Newmann et al. (2000) further assert that, to improve school effectiveness, school capacity should also include the "knowledge, skills, and dispositions" of individual teachers, the "strength of the school's professional community," "program coherence," the "nature of principal leadership," and the "quality of its technical resources" (pp. 273-288). They further suggest that a school's capacity can be improved by developing the personal and professional capacity of both principals and teachers.

Investigating school capacity

Many scholars have turned their attention to the topic of school capacity in both theoretical and empirical investigations. For example, Malen and Rice (2003) conceptualize school capacity as school conditions relating to the "nature of a school's resource base" and the productivity of its resources (p. 633). In analyzing the resource base of school capacity, they embed two generic categories—fiscal, human, social, and cultural capital and information resources—into the framework developed by Rice and Croninger (2001). In addition to the availability of resources, they also emphasize "the ability of a school to translate resources into expected outcomes" (Malen & Rice, 2003, p. 635).

Heck and Hallinger (2009, 2010, 2011) and Hallinger and Heck (2010) conducted a series of studies on leadership, school capacity, and school improvement. Heck and Hallinger (2009, 2011) define school capacity as school conditions comprising multiple features, including communication, trust, the quality of student support, a sustained focus on improvement, and teachers' professional capacity. These researchers' investigations confirm direct relationships between both school leadership and school capacity and between school capacity and school improvement.

In an overview of research in this area, Dinham and Crowther (2011) propose three interrelated aspects of school capacity: 1) material-related aspects, e.g., students, teachers, infrastructure, and resources; 2) more intangible aspects, e.g., the school climate and culture, staff motivation and cohesion, teacher quality, and professional learning; and 3) external resources and support for the school at the systemic, national, and international levels. They further recommend that school capacity-building be "undertaken and achieved through a range of mechanisms, encompassing professional learning, within-school specialist analysis of instructional quality and associated learning conditions, alignment of key within- and between- school factors, and cross-school clustering and networking" (Dinham & Crowther, 2011, p. 621).

School capacity is often defined as an array of constituent components. An early version of school capacity, as defined by Knapp (1997) on the basis of studies carried out on the school reforms implemented in the U.S. state of California, comprises vision and leadership, collective commitment and supportive norms, knowledge or access to it, resources, and structures conducive to learning. Newmann et al. (2000)

identify five dimensions of school capacity: principal leadership, professional community, program coherence, technical resources, and the knowledge, skills, and dispositions of individual teachers. In addition to these five dimensions, Borko, Wolf, Simone, and Uchiyama (2003) add a sixth, namely, learning opportunities for teachers. The increasingly large array of school components covers the key aspect of school- and classroom-level conditions.

The most recent large-scale Hong Kong-based studies in this area were led by Walker and Hallinger (e.g., Hallinger, Lee, & Chui, 2011; Ko, Hallinger, & Walker, 2012; Walker, Lee, & Bryant, 2014). They adapt their instruments from Leithwood and Jantzi's (2000) scale surveying organizational conditions and school leadership. This scale has been found to be an effective tool for capturing the linking, intervening, and mediating functions that school capacity exerts between principal leadership and school improvement (Walker & Ko, 2011). The seven dimensions in this study (Walker & Ko, 2011) are school capacity scale are trust, communication, professional learning community, alignment, coherence and structure, resources capacity, and support for students.

Ko and Hallinger (2012) add an additional two dimensions, organizational commitment and collaboration, which are extracted from the scales developed by Alper, Tjosvold, and Law (1998) and Allen and Meyer (1990), to capture more information about school capacity. The array of organizational elements they include fall into the broad categories of schools' "human and social resources" and "supportive structural features" proposed by Bryk, Camburn, and Seashore Louis (1999, p. 756). Using the nine-dimension school capacity structure put forward by Hallinger and Ko (2012), Li, Hallinger, and Ko (submitted) find that the school capacities connected to human relations and social resources—or social capacity in brief (i.e., trust, communication, and collaboration)—affect teachers' professional learning to the greatest extent. Walker, Hu, and Qian (2012) further point to teachers' professional learning as the most significant predictor of school improvement over time.

As noted, school capacity can be summarized as "the collective power of the full staff to improve student achievement schoolwide" (Newmann et al., 2000, p. 261).

Newmann et al. (2000) propose that, at the school level, student learning is affected "most directly by the quality of instruction," and instruction is affected by school capacity (p. 261). School capacity is in turn affected by the "actors which sponsor polic[ies] or programs on a variety of issues," e.g., school management procedures, curriculum and assessment, and teacher development (Newmann et al., 2000, p. 261). As the agent who stands between the school's teachers and the sponsoring actors, principals represent both sides and must adapt system-level plans for school-level implementation. This chain outlines the interrelatedness of stakeholder involvement and student learning. Identification of the components of school capacity that have significant mediating power between the two will provide considerable insights to both policy and practice.

In sum, research findings suggest that "building the capacity for school improvement" means "creating the conditions, opportunities and experiences" for teacher professional learning, student achievement, and school improvement (King & Bouchard, 2011, pp. 654 and 656). Further, principals exert effects on school outcomes primarily by establishing interpersonal relationships within the school (Hallinger & Heck, 1996; Lu, Jiang, Yu, & Li, 2014). The following subsections constitute an extensive review of the literature on trust, communication, and collaboration. These factors are related to human relations in schools, and are generally considered key components of school capacity.

2.3.1 Trust

Defining trust

In the recent school improvement literature, trust is defined as "a social resource that is an important element of school capacity" (Cosner, 2009, p. 250; see also Bryk & Schneider, 2003; Tschannen-Moran, 2000, 2004; Tschannen-Moran & Hoy, 2000). However, more specific conceptual definitions vary from one study to another. Baier

(1986) defines trust as "the reliance on others' competence and willingness to look after, rather than harm, things one cares about which are entrusted to their care" (p. 259), whereas Mishra (1996) views it as "one party's willingness to be vulnerable to another party based on the belief that the latter party is (a) competent, (b) reliable, (c) open, and (d) concerned" (p. 5).

In Hoy and Tschannen-Moran's (2000) comprehensive review of the normative and empirical literature on trust, they identify five key components commonly used to measure trustworthiness: benevolence, reliability, competence, honesty, and openness. The multifaceted nature of trust is reiterated in later studies (e.g., Tschannen-Moran, 2004). For example, in a long-term on-the-spot observational study, Sebring and Bryk (2000) identify four vital indicators of trust in schools, i.e., respect, competence, personal regard, and integrity.

Hoy, Tarter, and Hoy (2006) succinctly define trust as "one's vulnerability to another in terms of the belief that the other will act in one's best interests" (p. 429). Kutsyuruba, Walker, and Noonan (2011) propose the following wordier definition of trust based on a synthesis of recent definitions. They state that trust is

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

In addition, they also confirm Tschannen-Moran and Hoy's (1998) earlier finding that "what is common across most general definitions of trust, either explicitly or implicitly, is the willingness to risk in the face of vulnerability" (Kutsyuruba et al., 2011, p. 472). The role that risk plays in social systems is highlighted in Goddard, Salloum, and Berebitsky's (2009) study of the mediating effects of trust in the relationships between several school contextual factors and student academic achievement (see also Seashore Louis, 2007).

Further, Lewicki and Wiethoff (2000) point out that one's ability to trust others is based on three elements: one's belief system developed through life experience,

social rules and norms, and one's experiences within a given relationship. In this sense, distrust exists simultaneously with the cultivation of trust. For example, from the interpersonal perspective, one may trust others in one circumstance but distrust them in another. In the workplace, distrust of other people and institutions is prevalent (Deutsch, 1973; McKnight & Chervany, 2001; Mitchell, 1996). In these circumstances, distrust operates as a social mechanism to avoid negative consequences or reduce risk. However, in the professional arena, it is only through sufficient trust between people that collective achievements can take place (Handford & Leithwood, 2013; Lewicki & Wiethoff, 2000).

Investigating trust

Next, the literature on the role that trust plays in school settings is considered. Earlier studies focus primarily on faculty trust and its association with student learning and school improvement (Goddard, Sweetland, & Hoy, 2000; Goddard, Tschannen-Moran & Hoy, 2001; Handford & Leithwood, 2013). For example, trust is found to be a key influential factor in the effectiveness of school operations (Schwabsky, 2014; Van Mael & Van Houtte, 2009). In primary schools, trust between colleagues is found to significantly affect student learning (Hoy, Tarter, & Witkoskie, 1992). Social trust among faculty members is found to be the strongest facilitator of teacher professional learning, which in turn promotes teaching quality (Bryk et al., 1999). Cosner (2009) cites the cultivation of collegial trust as a key feature of high school principals' capacity-building work, whereas Goddard et al. (2009) contend that trust is positively associated with teacher learning and teaching. These findings largely emphasize the notion that trust is an enabling or facilitating condition that operates in concert with other school-level conditions to bring about improvements in teaching and learning (see Seashore Louis, 2007).

Trust contributes to school effectiveness in multiple ways. Conversely, mistrust between principal and teachers leads to conflict. Trust is also positively related to teachers' professionalism and cooperation and their sense of efficacy (Addi-Raccah,

2012; Goddard, Hoy, & Hoy, 2000; Schwabsky, 2014). Bryk and Schneider (2003) examine the relationship between trust and teacher instruction, and assert that "while trust alone does not guarantee success, schools with little or no trust have almost no chance of improving" (p. 44). They further report that students from primary schools boasting high levels of social trust are more likely to benefit from teacher effectiveness and make academic improvements. Social trust is also regarded as the "connective tissue that binds individuals together to advance the education and welfare of students" (Bryk & Schneider, 2003, p. 44). As Uline, Miller, and Tschannen-Moran (1998) report, in a positive school climate, trust contributes greatly to school effectiveness and student achievement.

Principals generally take the lead in developing and sustaining social trust at the school level. For example, the teacher-principal trusting relationship is reported to be significantly and directly related to teaching effectiveness and school improvement (Hoy, Tarter, & Hoy, 2006; Tarter, Sabo, & Hoy, 1995). Cosner (2009) reports that the indirect effects of principal leadership practices on teacher practice depend to a great deal on the level of trust that teachers have in their principals. Trust in principals supports the development of teachers' "knowledge, skills, and abilities that [are] necessary for reform enactment" and the enhancement of classroom instruction (Cosner, 2009, p. 250). In addition, teachers' job satisfaction and commitment are also related to their trust in the principal (Podsakoff, MacKenzie, Moorman, & Fetter, 1990). Further, in their study of middle schools, Tarter, Sabo, and Hoy (1995) report that "trust in the principal and trust in colleagues independently move the organization toward effectiveness" (p. 47; see also Hoy, Tarter, & Witkoskie, 1992).

Trust is considered a key quality indicator of school capacity. At the school level, a trusting work environment leads to positive school conditions, capacity, and consequences. Viewed the other way around, school success is dependent on constructive social relations among colleagues. Cosner (2009) highlights the importance of principals promoting collegial trust as a capacity-building mechanism in schools. He also claims that principals can establish trust in their schools through supportive leadership practices. However, it is difficult for them to make teachers trust one another in any direct fashion (Handford & Leithwood, 2013).

More broadly, trust is needed among all stakeholders. As the lubricant enabling schools to work smoothly, trust bonds people together for a shared objective. Trust also fosters many other structural and social-psychological school conditions. For instance, trust is the basis for effective collaboration and communication, which are preconditions for school-level productivity and effectiveness (Baier, 1986; Daly & Chrispeels, 2008; O'Reilly & Roberts, 1977). In addition to strongly affecting teachers' well-being, trust also fosters collaboration among teachers. Sebring, Allensworth, Bryk, Easton, & Luppescu (2006) identify collegial trust as a major role set in schools in which trust really matters. Cosner (2009) also reports that trust is "essential for genuine collaboration among educators, enabling them to work together to develop a shared understanding of … reforms" (p. 250).

In sum, research on school improvement shows that supportive principal leadership can help to establish trusting relationships in the school, thereby promoting teacher professional learning and valued educational outcomes. This study does not focus narrowly on faculty trust or principal-teacher trust, but instead considers the trusting relations that exist among all members of the school. Given that trust is increasingly recognized as a key element in high-performing schools, an investigation of how trust affects teacher professional learning is likely to bring insightful new findings. The conceptual model used to test whether trust mediates the effects of principal leadership change on teacher professional learning is illustrated in Figure 1.

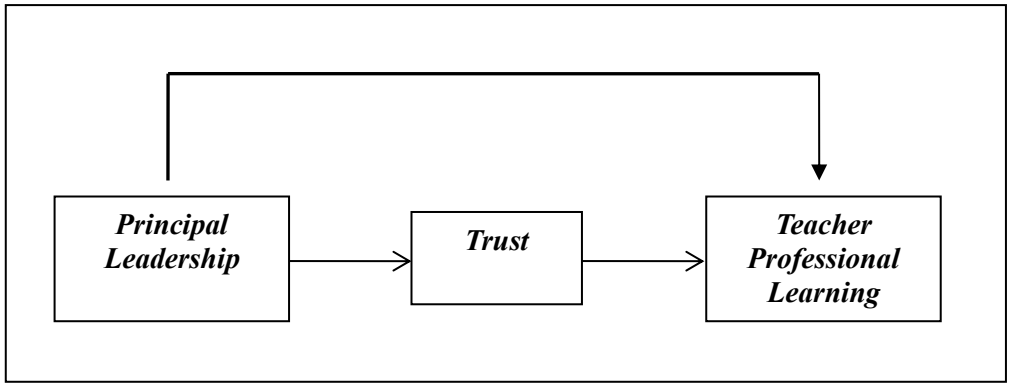

Figure 1 Conceptual Model Showing Mediating Effects of Trust on the Relationship between Principal Leadership and Teacher Professional Learning

2.3.2 Communication

Defining communication

As a basic element shaping human relations in schools, communication is broadly defined as the mutual ability to convey ideas through verbal or non-verbal means to influence another's behavior to achieve desired objectives. It is also generally defined as "any means by which an individual relates experiences, ideas, knowledge and feelings to another including speech, sign language, gestures and writing" (Harryman, Kresheck, & Nicolosi, 1996, p. 66). According to Deetz and Stevenson (cited in Institute of Healthy Aging, 2013), effective communication takes place when people present messages clearly to meet specific needs and goals.

Communication is also conceived of as the process through which people provide and receive information (Dwyer, 2005; Goldhaber, 1993; Tourani & Rast, 2012). Carey (1989) defines it as "a symbolic process whereby reality is constructed, maintained, repaired and transformed" (p. 23). In this sense, communication is a process through which people "convey a meaning in an attempt to create a shared understanding" (Gouran et al., 1994, p. 6). This definition reflects the pervasiveness of communication. Experts even contend that many accomplishments and failures are directly related to individuals' communication skills and ability to fulfill interpersonal

goals. The process conception of communication is not opposed to the idea that communication occurs in multiple ways and through multiple channels. Information can be transferred vertically along the school hierarchy and horizontally among staff of the same level (Dwyer & Fus, 2002; Goldhaber, 1993; Odden & Sias, 1997).

Investigating communication

This section now turns to a review of the literature on the role of communication in the school environment. In school settings, communication takes place through both formal (e.g., official procedures and meetings) and informal channels (e.g., casual chats and memos) (Goldhaber, 1993; Gronn, 1983). Communication can be assessed by how open it is and by how freely information flows among members of the organization (Muchinsky, 1993). Communication can also be characterized by its functions (Thayer, 1988). Based on an extensive review of the literature, De Nobile and McCormick (2008) develop a comprehensive schema in which four functions of communication are applicable to schools: directive, supportive, cultural, and democratic. In a more recent study, De Nobile, McCormick, and Hoekman (2013) include as many as 10 communication factors, several of which are identified as predictors of occupational stress in teachers. For example, supportive communication with the principal is found to alleviate teacher burnout and role ambiguity (see also Margolis & Nagel, 2006; McCormick & Barnett, 2011; Starnaman & Miller, 1992). Conversely, insufficient communication among staff results in unresolved professional problems, thereby generating stress for teachers (De Nobile et al., 2013; McCormick, 1997; McCormick, Ayres, & Beechey, 2006).

In addition to the organizational setting, the cultural context in which communication occurs may also be a concern. Hall and Hall (1990) analyze the relation between communication and culture, and distinguish high- and low-context cultures. In a high-context culture, the real and formal aspects of communication differ; that is, when high-context communication is dominant, the formal aspect of communication is in fact the nonfunctional aspect. Therefore, people's real intentions can be

understood only through informal channels. In low-context cultures, in contrast, communication is usually open and direct, and there is little formal-informal differentiation (Ryan & Rottmann, 2009).

Leadership begins with communication. Barge (1994) discusses the importance of communication in leadership theories. The ability to clearly communicate is an essential component of effective leadership. The English and Welsh National Standards for Headteachers (Teacher Training Agency, 1998) propose a set of basic leadership and management competencies and skills for school leaders, with 35 principalship skills and attributes categorized into the areas of leadership, decision-making, communication, self-management, and attributes (Bush & Glover, 2003). As the key responsibility of an effective leader, communication is also regarded as a key starting point for leaders (Adams, 2001; De Nobile et al., 2013).

The value of effective communication and how it affects leadership was noted by researchers fairly early. For example, Thayer (1988), a communication theorist, conceptualizes leadership as a component of communication and the ability to communicate a school's vision and goals in a way that gains support. In explaining how leadership functions at the school level, Stoll and Fink (1996) introduce the concept of invitational leadership, which they define as "communicating invitational messages to individuals and groups with whom leaders interact in order to build and act on a shared and evolving vision of enhanced educational experiences for pupils" (p. 109).

Communication is effective only when each party correctly expresses and receives information, and the information is accurately understood: "Processing the quality of effective communication makes for a high quality leader because it enables one to express ideas successfully" (Kaye, 1998, p. 44). Sparks (2003) believes that leaders must develop effective communication skills to maintain positive and productive relationships at school. Danielson (2006) also considers communication to be an important part of educational leadership. She further states that to maximize teaching effectiveness, it is essential to maintain effective communication at different levels within the school. In addition, good communication also encourages constructive interactions between principals and teachers. To foster teacher professionalization,

principals should begin by initiating effective two-way conversations.

By and large, the bulk of the literature indicates a direct link between leadership and communication in the school environment. Although there is relatively little research in this area, most prior studies suggest that communication plays a key role for principals looking to provide support to teachers to promote their professional learning and teaching (e.g., Danielson, 2006; De Nobile et al., 2013; Tschannen-Moran, 2000). Communication in this sense is not restricted to either formal or informal approaches to information transformation, but can involve any means of information delivery. Goddard et al. (2009) also note the conceptual and empirical importance of treating communication as an organizational measure.

The conceptual model shown in Figure 2 was used in the current study to test whether communication has mediating effects on the relationship between principal leadership and teacher professional learning.

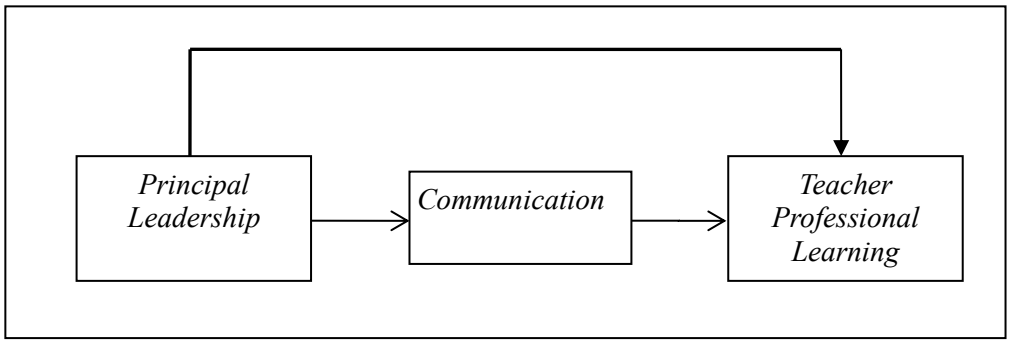

Figure 2 Conceptual Model Showing Mediating Effects of Communication on the Relationship between Principal Leadership and Teacher Professional Learning

2.3.3 Collaboration

Defining collaboration

Compared to other school capacity indicators such as trust, teacher collaboration is much less explored, if not actively marginalized (Hargreaves, 1994a, 1994b; Lavie,

2006). As one of the espoused values and cultural elements in Jenni and Mauriel's (2004) study, collaboration is regarded as a critical function for improving the performance of teachers and students (see also Goddard et al., 2007). Leithwood (2007) examines the emotional side of school, using the term "collaborative school culture" to refer to "the nature and extent of interaction among teachers about their work" (p. 615).

The term "collaboration" is often used interchangeably or in parallel with "cooperation" or "partnership" (Connolly & James, 2006). There is no clear distinction between the three terms, and all carry the meaning of shared work or working together. Friend and Cook (1992) offer 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). The defining characteristics they outline are "voluntary, based on parity, requires a shared goal, includes shared responsibility for key decisions, and includes shared accountability for outcomes, and based on shared resources" (Friend & Cook, 1992, p. 3).

In a later study of school leadership for teacher collaboration, Cook and Friend (1995) make it explicit that collaboration is the way that teachers implement a specific activity rather than the purpose or nature of a specific collaborative activity. In exploring the nature of collaboration among teachers, Lavie (2006) reviews the discourses surrounding such collaboration and examines the various discursive logics related to the concept. The five discourses he identifies are cultural, school effectiveness and improvement, school-as-community, restructuring, and critical discourses, which provide complementary underpinnings of the multiple facets of the complex phenomenon of teacher collaboration (Lavie, 2006).

Investigating collaboration

Empirical research on the effects of teacher collaboration is now reviewed. Friend and Cook (1992) point out two issues related to the fostering of a formal teacher

collaboration structure: "the quality and integrity of the intervention, activity, or program that is being executed collaboratively" and the "knowledge, skills, and readiness of teachers to work collaboratively" (p. 424). They further assert that of the multiple benefits of collaboration, the most promising for schools is the opportunities it brings to teachers to interact in teaching and learning (see also Barth, 1990) and the direct effects it has on students (see also Idol & West, 1991). Firestone and Pennell (1993) also claim that the way in which teachers collaborate with others on teaching issues is positively related to, but does not always result in, the improvement of teaching practices and overall school performance (see also Datnow, Park, & Kennedy-Lewi, 2013; Horn & Little, 2010; Lally & Scaefe, 1995).

Mattessich and Monsey (1992) argue that collaboration should be based on the mutual trust and respect of group members who are willing to compromise (see also Connolly & James, 2006). Teachers benefit the most in a collaborative learning process. One of the key benefits of collaboration is that it "creates learning opportunities" among teachers (Firestone & Pennell, 1993, p. 506). It is further claimed that the teacher learning process is collaborative in nature (Lu et al., 2014; Marks & Louis, 1999; Printy, 2008). During collaboration, particularly a structured learning process, teachers solve problems, overcome difficulties, and grow toward professionalism. Although it has clear benefits, school-based collaboration also has costs, such as the time and preparation needed for teachers to collaborate effectively and possible conflicts among teachers.

The referent of collaboration in education is often teachers; hence, the prevalence of the term "teacher collaboration." However, in many educational undertakings, the referents can be any of the stakeholders concerned. Tschannen-Moran (2000) includes three referents in her study on collaboration and trust, namely, principals, teachers, and parents. She further explores three collaborative processes that occur in school settings: "collaboration between the principal and teachers on school-level decisions," "collaboration with parents on school-level decisions," and "collaboration between teachers on classroom-level decisions" (Tschannen-Moran, 2000, p. 317). She broadly defines collaboration as "the extent to which teachers [perceive] themselves and parents to be not only involved but to exercise influence over school and

classroom-level decisions" (Tschannen-Moran, 2000, p. 317).

Wong (2010) identifies the competence to foster teacher collaboration as a key characteristic of effective principals, and Lu et al. (2013) emphasize that principals need to recognize the importance of creating a collaborative working environment for teachers. Of the six key elements of successful collaboration proposed by Mattessich and Monsey (1992), environment is the first and foremost. The other five are membership characteristics, process and structural issues, communication, purpose, and resources. Building a collaborative environment and structures in the school is also included as a key component in the theorization of transformational leadership (Griffith, 2004; Leithwood & Jantzi, 2000, 2005).

Principals can also join and interact in the school-wide collaborative process to provide support for and promote teacher professional learning. More importantly, they can create opportunities for teachers to engage in joint decision-making and shared leadership (Tschannen-Moran, 2000). DuFour (1991, 1998) recommends that school principals collaborate with expert teachers and have the latter share their wisdom with others. The participants in Slater's (2008) study asserted that principals' support helps to shape a psychologically safe environment conducive to collaboration (see also Gurr, 1996; Rowe, Hill, & Holmes-Smith, 1994).

It takes time and effort for principals to construct positive collaborative relationships even in a psychologically safe school environment. As a key indicator of human relations in the workplace, collaboration has emotional underpinnings and should be practiced in an affective process. Human relationships are the building blocks of authentic collaboration in which interaction occurs (Cook & Friend, 1991, 1995). In addition, teachers' work commitment and effectiveness are influenced by the emotions and relations in the affective process. Principals thus require the capacity to nurture positive emotional connections between teachers (Leithwood, 2007).

Given the emotional nature of collaboration, principals must be extremely cautious when playing the leading role in the collaborative process. As Emihovich and Battaglia (2000) note, collaboration is "very emotional work, where the various partners should expect to remain committed for a considerable period of time" (p. 236). However, principals' emotional effort expended on teacher collaboration is

deemed to be a process that is anything but peaceful. In supporting the collaborative process, principal leadership is bound to be discomforting, ambiguous, and uncertain (Slater, 2008, p. 331). For example, Beatty (2000) notes that, although schools provide a place for human relationships to develop, authentic relationships are difficult to maintain. In addition, "bureaucratically contrived and administratively controlled" collaboration will not lead real change (Hargreaves, 1992a, p. 80). In other words, structured teacher collaboration does not necessarily lead to improvements in teaching and learning (Datnow et al., 2013; Horn & Little, 2010; Kelchtermans, 2006). The way that teacher collaboration unfolds and the context in which it takes place are important factors (Datnow et al., 2013). Presumably, informal collaboration among teachers may be more effective when principal leadership is not in evidence (Leonard, 2010; Scribner, Sawyer, Watson, & Myers, 2007). Be it formal or informal, teacher collaboration will exert real effects provided that it is spontaneous, voluntary, development-oriented, and pervasive across time and space (Hargreaves, 1992a).

Other supportive practices available to principals 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, which is in turn predictive of the level of collaboration in the school. More explicitly, an effective way for principals to construct a climate that supports collaboration is to enable a trusting atmosphere. The participants in Slater's (2008) study confirmed that specific types of communicative behavior displayed by principals support collaboration at the school level. They all agreed that to enhance collaboration, principals must have developed the skills of effective communication. Equally important is that the principal's role be supportive or conducive rather than directive.

The foregoing literature review highlights that principal leadership is needed to foster teacher collaboration aimed at strengthening professional learning. In addition to confirming that collegial collaboration is essential to teacher professional practices (Quicke, 2000) and educational progress (Hargreaves, 1994a; Goddard et al., 2007), previous research has also established connections among trust, communication, and collaboration (Tschannen-Moran, 2000; Slater, 2008). However, despite these factors

being important social resources for school capacity-building, their links to principal leadership and teacher professional learning are rarely addressed together.

To test whether teacher collaboration mediates the principal leadership effects on teacher professional learning, the conceptual model depicted in Figure 3 was constructed. In educational settings, collaboration is often conceptualized on the basis of the features of the school environment and the social relations within it (Ebers, 1997), a conceptualization that is also used in this study.

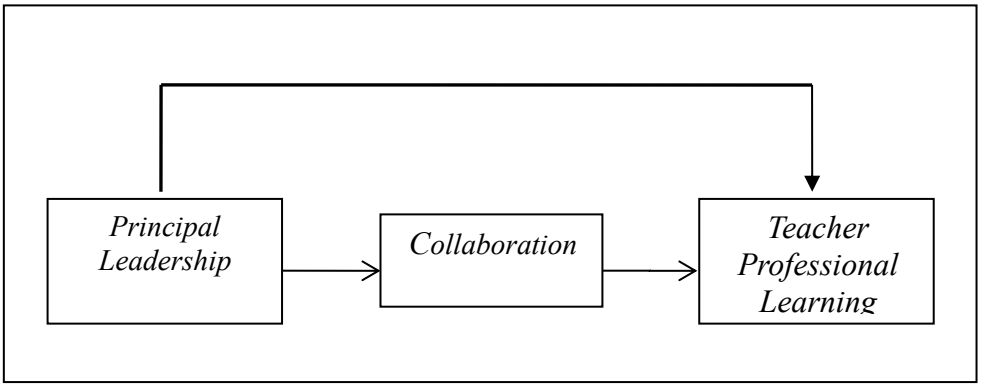

Figure 3 Conceptual Model Showing Mediating Effects of Collaboration on the Relationship between Principal Leadership and Teacher Professional Learning

The next section turns its attention to the literature on teacher professional learning.

2.4 Teacher profession learning

Defining teacher professional learning

Conceptualizations of teacher professional learning vary, including staff development, peer coaching, professional learning communities, and communities of practice (Joyce & Showers, 1992; Little, 1993; Louis, Marks, & Kruse, 1994; Vescio, Ross, & Adams, 2008). Wei et al. (2009) define teacher professional learning as "a product of both externally-provided and job-embedded activities that increase teachers' knowledge and change their instructional practice in ways that support student learning" (p. 1). The word "professional" implies a specialized knowledge base and professional standards, whereas "learning" emphasizes the collective objective of school and student improvement (Stoll, Bolam, McMahon, Thomas, & Wallace, 2006; Talbert & McLaughlin, 1994).

Despite the varied conceptualizations of teacher professional learning, "the process-product logic has dominated the literature on teacher professional learning,"

although it lacks sufficient explanatory ability and empirical support (Opfer & Pedder, 2011, p. 376). Further, despite the urgent need for complex conceptualizations of teacher professional learning, "the majority of writings on the topic continue to focus on specific activities, processes, or programs in isolation from the complex teaching and learning environments in which teachers live" (Opfer & Pedder, 2011, p. 377). Guskey (2003) posits that the environment or real-world context of teacher professional learning should be a key criterion in evaluating the effectiveness of such learning.

Investigating teacher professional learning

The content and focus of, and processes involved in, teacher professional learning have attracted the attention of many researchers (Vescio et al., 2008). Some researchers assert that such learning should focus on deepening both subject knowledge and pedagogical methods (Kruse, 2001; Little, 1993; Louis et al., 1994; McLaughlin & Talbert, 1990). For example, Corcoran and Goertz (1995), Hargreaves (1992a), and Little (1993), among others, maintain that to promote teacher professional learning that improves teaching, teachers' development experience should concentrate on their instruction of subject knowledge and that ongoing support and feedback from colleagues and experts should also be provided, as long as teachers' privacy is respected.

Teachers' learning and support experiences should not be episodic and short-term, but rather continual and sustained (Little, 1993; Newmann et al., 2000). Although the professional learning of teachers can be individualized, the establishment of a professional learning community has been recommended as a means of facilitating ongoing learning among teachers (Kruse, 2001; Louis et al., 1994; Vescio et al., 2008). Further, to ensure the effectiveness of teacher learning, professional teacher development programs must be in place (DuFour, 1998; Dupont, 2009). An increasing number of studies show that teachers learn through CPD programs and that the learning experience improves the quality of their instruction (Hadar & Brody,

2010; Louis, Marks, & Kruse, 1994; O'Connor, 2004; Pancucci, 2008).

The importance of ongoing teacher professional learning to school effectiveness is well established (e.g., Glatthorn, 1992; Robinson et al., 2008). Desimone, Smith, and Ueno (2006) establish a conceptual framework for assessing the effects of teacher development on teachers' instructional habits and student learning. They also lay out a framework for teacher professional learning involving five key components: content focus, active learning, coherence, sufficient duration, and collective participation. They stress that only in a relaxing and psychologically safe environment can teachers share or deprivatize their personal practices and engage in reflective dialogue. In a similar vein, Fraser, Kennedy, Reid, and McKinney (2007) define teacher professional learning using a triple-lens framework comprising the domain of influence, capacity for professional autonomy and transformative practice, and sphere of action.

It is widely claimed that through ongoing teacher development principals can create a school environment that enhances teacher professional learning (DuFour, 1998; Robinson et al., 2008; Youngs & King, 2002). In this sense, principals play an essential role in creating school conditions through an ecological approach that promotes teacher professional learning (Tang & Choi, 2009). Although highlighting the prominence of learning-directed professionalism, Ko, Hallinger, and Walker (2012) also note that teacher professional learning is a key proxy for differentiating schools with different levels of performance.

Creating school conditions that support teacher professional learning is key to school capacity-building (Hallinger & Murphy, 1985; Robinson et al., 2008). Principals can foster teacher professional learning by adopting leadership practices that encourage teacher development (DuFour, 1991; Saphier & King, 1985; Youngs & King, 2002). Examples of such practices include allocating resources, enabling teacher participation, selecting quality programs, ensuring alignment with school goals, and supporting the effective implementation of content learning in professional development programs. Without the direct support and involvement of principals, it is difficult for teachers to achieve the level of consistent engagement in professional leadership necessary to effect school improvement.

Beyond the school level, teacher professional learning should also be promoted at the system level through policy infrastructure and policy coherence (Darling-Hammond & McLaughlin, 1999; Mockler, 2005; Tang & Choi, 2009). The main reason to promote such learning at the system level is that it is regarded not only as a key element of school capacity, but also a driving force behind positive student outcomes and school improvement (e.g., Hattie, 2009). Louis and Marks (1998) find teacher learning to account for up to 85% of the improvement in student outcomes across schools.

Another important reason to promote teacher professional learning at the system level is that changes in the policy environment or contextual changes in society require teachers to engage in professional learning. Schools that place limited stress on teacher learning will be unable to meet the urgent demands of and keep pace with the rapid marketization and globalization of education that is taking place worldwide. Mockler (2005) connects the school organization with the wider educational context, contending that

> the development of a transformative teaching profession requires an education community, which on both school and system levels, not only tolerates risk-taking, but embraces it as a path to authentic relationship, critical and innovative practice, and ongoing growth and transformation (p. 742).

In addition to comprehensive support from the school and system, from a micro perspective teacher professional learning can also be improved by influencing teachers' conceptions of and beliefs about teaching. Teachers develop their conceptions of teaching from their early experience of being students and from their teaching practice later on (Dall'Alba, 1991; Martin & Balla, 1991; Prosser, Trigwell, & Taylor, 1994). These conceptions can be remolded to affect teaching and learning positively. Action research as a conceptual approach to changing teachers' perceptions has been recommended by many researchers (Gibbs, 1995; Ho, Watkins, & Kelly, 2001; Kember, Ha, Lam, Lee, Ng, Yan, & Yum, 1997).

In sum, it is posited that human relations, or collegiality, at school constitute one of the "orthodoxies of educational change and school improvement" (Hargreaves, 1992a, p. 80). The most fruitful strategy for enhancing teacher professional growth may be connecting principal leadership with teacher professional learning while creating a trustful, communicative, and collaborative work environment. On the basis of the foregoing literature review on the three main constructs, a conceptual framework is constructed in the next section.

2.5 Conceptual framework

The foregoing literature review introduces the idea of educational change and outlines its key variables, the relationships among those variables, and the frontiers of research in this area. This section presents the conceptual framework that guided the study.

In recent years in the field of educational leadership, a number of variables, particularly those found to directly affect student achievement, have been investigated. They include the teaching environment (Chang, 2011; Hsieh, 2010; Li & Chiang, 2008), trust (Hoy, Tarter, & Witkoskie, 1992; Tschannen-Moran, 2000, 2004), student engagement (Leithwood & Jantzi, 2000), teacher practices (Leithwood, 2007; Love & Kruger, 2005, Sun & Wang, 2007), teacher commitment to educational change (Geijsel, Sleegers, Leithwood, & Jantzi, 2003), and organizational learning (Mulford & Silins, 2009).

As it has a limited direct effect on student achievement, principal leadership is often seen as an important mediated or indirect process (Hallinger & Heck, 1998, 2010; Hallinger, Lee, & Szeto, 2013; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Mascall, Leithwood, Straus, & Sack, 2008; Nir & Hameiri, 2014). Researchers have attempted to identify the pathways through which principals can affect student learning (Hallinger & Heck, 1998; Leithwood et al., 2010; Ross & Gray, 2006). Setting various distal variables as the targets, researchers have also noted the

important effects of certain school- and classroom-level conditions, known collectively as school capacity (e.g., Krüger, Witziers, & Sleegers, 2007; Mulford & Silins, 2009; Sleegers et al., 2002; Tschannen-Moran, 2000). Examining the effects of various school capacity factors on the relationship between principal leadership and targeted outcomes offers an alternative to examining the principal leadership effects on student achievement and school development (e.g., Bryk & Schneider, 2002, 2003; Hallinger & Heck, 2010; Mulford & Silins, 2009; Robinson et al., 2008). It is also of educative importance to identify the factors connected to principal leadership and school capacity and those affecting student outcomes. Inquiries into the nature and strength of these factors contribute to a deeper understanding of successful leadership and school improvement (Leithwood & Jantzi, 2000).

Pitner (1988) suggests using different pathways to illustrate direct and indirect effect relationships when conceptualizing school leadership effects. Integrated with mediation theories (see Baron & Kenny, 1986; Hallinger & Heck, 1998; Scheerens, 2012), the presence of direct leadership effects implies that the strength of school leadership has a significant effect on certain facets of the school (e.g., faculty trust, teaching effectiveness, or school improvement). An indirect leadership effect implies that a portion (i.e., partial mediation) or all (i.e., full mediation) of the leadership effects on school conditions operate through other variables.

The accurate specification of a conceptual model has both theoretical and practical significance (Heck & Hallinger, 2010). From the theoretical perspective, explicit specification of the nature of the relationship among the variables in the conceptual model is essential both for the clarity of intellectual discourse and for conducting valid empirical investigations (Bridges, 1982; Hallinger & Heck, 2011). In terms of policy and practice, accurate specification of the nature of leadership effects (i.e., indirect, direct, or both) is fundamental to informing stakeholders of the strategies and intermediary targets that are most likely to meaningfully achieve the desired student and school outcomes (Kyriakides et al., 2009).

Figure 4 shows the general conceptual framework of this study. The arrows represent both the direct and indirect effects of principal leadership on teacher professional learning. The paths show both the processes and directions by which principal

leadership affects teacher professional learning. This framework proposes that principals' leadership practices affect the professional learning of teachers both directly and indirectly. The indirect effects are made possible through the creation of conditions that nurture human relations in schools. In summary, principal leadership affects teacher professional learning indirectly by building a climate of trust, communication, and collaboration in the school.

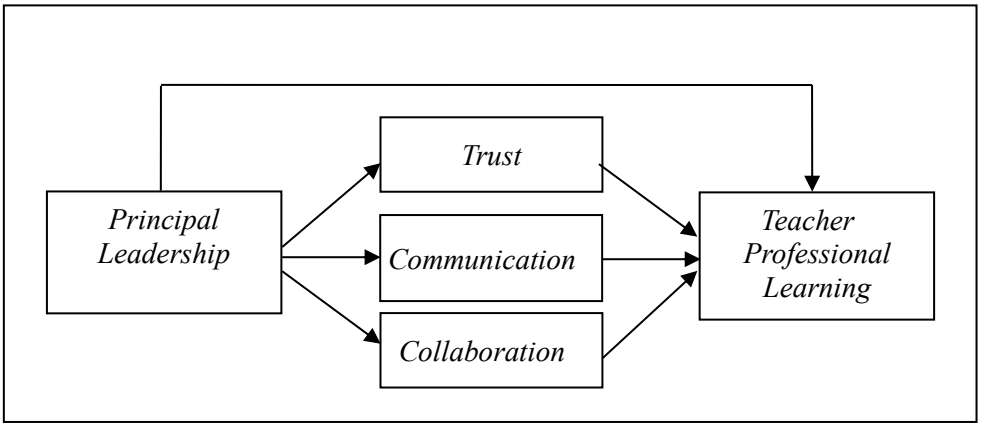

Figure 4 The Conceptual Framework Showing the Mediated Relationships between Principal Leadership Change and Teacher Professional Learning via Trust, Communication, and Collaboration

Teacher professional learning in this study is conceived of as a complex system and process by which teachers continue to learn how to improve student performance while interacting with one another. Such learning also constitutes operationalization of the functions that schools and authorities fulfill in building school capacity. Teacher professional learning is set as the distal variable. As a fundamental element of school capacity, teachers' productive engagement in professional learning has drawn considerable research attention (Hattie, 2009; Leithwood et al., 2008, 2010; Louis et al., 2010; Mulford & Silins, 2003, 2009). In their meta-analysis of educational leadership studies, Robinson et al. (2008) state that principals' support for and involvement in teachers' professional learning constitute the most robust pathway linking leadership and learning in schools. In other words, a principal is directly responsible for promoting the development of his or her school thorough the promotion of teacher professional learning.

Principal leadership is the predictive variable in this study. It is conceptualized as a composite of generic leadership practices (see Figure 4) based on the Day et al. (2009) conclusion that there is a pool of good practices used by successful principals. This pool of generic principal leadership practices is operationalized as seven core dimensions. In accordance with the methodological design of mediation analysis,

these seven dimensions are kept parallel to and independent of one another in assessing the mediating effects. Although no attempt is made to be comprehensive, these core dimensions provide a solid foundation from which to promote the quality of principalship and education in Hong Kong schools.

The seven core dimensions, or key qualities, are based upon the framework of the key qualities of principal leadership stipulated by the Hong Kong ED (2002). As the creators of this framework, Walker et al. (2000) claim:

> The Key Qualities are a composite of meaningful and professionally relevant values, knowledge, skills and attributes possessed by effective principals in Hong Kong. They provide a baseline reference against which the present knowledge, skills, abilities and attributes of school leaders can be gauged, and future needed development charted (p. 3).

This key quality framework is widely used in educational leadership research in Hong Kong (e.g., Ko, Hallinger, & Walker, 2012; Kwan & Walker, 2008; Lee, Hallinger, & Chui, 2013; Walker & Kwan, 2009, 2010). The seven core dimensions/qualities are concerned with the critical practices of principals that significantly affect the educational objectives of schools. When characterizing principal practices in the Hong Kong context, the seven core dimensions also "hold generic general currency," considering that they are similar to those used and tested in England, the U.S., Canada, and Australia (Walker & Ko, 2011, p. 370; see also Day et al., 2006; Leithwood & Jantzi, 2000; Silins & Mulford, 2002a, 2002b; Walker & Riordan, 2010).

The concept of school capacity is conceptualized as a set of school-level factors connected with human relations, i.e., trust, communication, and collaboration. These factors are all indicators of a school's social capacity. In contrast to the more complex interactions between principal leadership and several intervening school-level variables in Hallinger, Bickman, and Davis's (1996) study, this study focuses on the one-way effects arising from principal leadership on teacher professional learning through school capacity. The three school capacity factors (i.e., trust, communication, and collaboration) are preliminarily identified as possible

mediators based on Li, Hallinger, and Ko's (submitted) study, which uses a wide range of different but largely complementary dimensions to expand scholarly understanding of school capacity. Among the array of constituents of school capacity, trust, communication, and collaboration function as lubricants in the construction of positive workplace human relations. They are also regarded as key elements in the efficient functioning and operation of schools (Bryk, Camburn, & Seashore Louis, 1999; Bryk, Lee, & Holland, 1993) and in school-wide improvement efforts (Bryk & Schneider, 1996; Goddard et al., 2007; Spillane & Thompson, 1997). Without trust, communication, and collaboration in the school, change efforts may have no lasting effects (Hargreaves, 1992b, 1994a, 1994b), and school capacity is unlikely to be nurtured and developed (Gurr et al., 2005). For these reasons, this study hypothesizes that trust, communication, and collaboration are mediators that facilitate principal leadership effects on teacher professional learning in Hong Kong primary schools.

To test the mediating effects of trust, communication, and collaboration, a series of single mediation models are first tested (see Figure 1 for *Trust*, Figure 2 for *Communication*, and Figure 3 for *Collaboration)*. For example, the model presented in Figure 1 illustrates the pathways through which principal leadership is proposed to have both a direct and indirect effect (mediated through trust) on teacher professional learning. To illustrate the nature of this mediated relationship in a stepwise manner, the model first proposes that principal leadership has a direct effect on teacher professional learning. Next, it suggests that principal leadership operates by influencing trust, which in turn influences teacher professional learning. Consequently, principals may exert an indirect effect on such learning via trust. Both partial and full mediation models are tested. The models with communication and collaboration as the potential mediators are tested in similar fashion. After each simple mediating analysis, the study moves forward to test the effects of individual mediators on the seven core areas of principal leadership practices and teacher professional learning. This further step is of both theoretical and practical significance. Upon verifying the effects of each mediator, a single-predictor-multiple-mediator model (see Figure 4) is constructed to assess the presence and strength of the joint mediating effects and to compare the effects of

each individual mediator. Finally, the joint effects of the mediators between the dimensional leadership efforts and teacher professional learning are tested.

It is proposed in this study that principal leadership, conceptualized as both generic practices and the seven core areas of practice, have both direct and indirect effects on teacher professional learning. Principals promote such learning by building a climate of trust, communication, and collaboration in the school. Investigation of the presence, significance, and strength of the effects of the mediators is of practical significance.

Another purpose of assessing the effects of the seven core dimensions of principal leadership is to compare those effects to determine how they differ. It is assumed that principal practices relating to instructional leadership and teacher development exert a greater effect on teacher professional learning than the other core areas of principal leadership. Indeed, Walker and Ko (2011) argue that principal leadership in the areas of instructional leadership and teacher development constitutes a response to local education policies and the practical needs of parents and students, and is thus of prime importance. Newmann et al. (2000) report that teacher development influences all aspects of school capacity and teacher professional learning. In addition, principals are believed to be capable of creating or changing school conditions and enhancing teacher professionalism through their efforts toward and involvement in teacher development (DuFour, 1991; Youngs & King, 2002).

The key implication of this conceptual framework is that principal leadership should be designed, and changed whenever necessary, to meet the needs of school capacity-building and promote teacher professional learning. In other words, to promote school capacity and teacher professional learning and maintain them at a high level, principals should adjust their leadership practices, particularly when putting effort into instructional leadership and teacher development.

Summary

This chapter begins with an introduction to the concept of educational change. It proceeds with a review of the key conceptual underpinnings of and empirical output on principal leadership, social capacity, and teacher professional learning. This review indicates that principal leadership helps to shape school conditions and build capacity and that school capacity contributes to teacher professional learning. The literature review is then extended to the three human relational factors of school capacity (i.e., trust, communication, and collaboration), which are hypothesized as mediators in the relationship between principal leadership and teacher professional learning. In the school context, human relations are believed to be salient features of the informal social structure that supports teacher professional learning and to reinforce the effects of principal leadership on teacher learning. The chapter concludes with the conceptual framework constructed on the basis of the literature review to guide the inquiry.

CHAPTER 3
RESEARCH METHODS

Introduction

This chapter has five sections. Section One explains the philosophical foundations and paradigmatic assumptions of the study. Section Two presents the research design and methods used, including school and teacher samples, and instrumentation. Section Three reports the procedures of instrument validation. Section Four covers the procedures of data collection and ethical issues. Section Five describes the framework for data analysis.

3.1 Philosophical foundations and paradigmatic assumptions

This quantitative study follows the tradition of positivism in its investigation into mediated relationships in the school context. The paradigmatic standing is decided by the empirical, confirmatory and deductive nature of the study. The philosophical assumption also provides a framework, much of it implicit, for making methodological choices in the research, for instance in choosing e.g., how to collect, analyzed, present, and interpret data. The collection of numerical data to verify the hypothesis is a key step in the scientific research cycle (Coolican, 2004). The purpose is to measure, quantify, and identify the pattern and test the extent of the observed phenomenon through a structured and systematic approach (Coolican, 2004). In short, positivism supports quantitative methodology and statistical analysis.

Different paradigms alert researchers to the "different phenomena of interest, different conceptions of the problem, and different aspects of events likely to be ignored within a single perspective" (Shulman, 1986, p. 5). Therefore, the selection of

a paradigm is dependent on the pertinent features of the phenomena to be observed and interpreted, and the conceptualization of the problems to be investigated. Although a single paradigm cannot enable a full illustration of the phenomenon and a totally reliable interpretation, the most applicable paradigm should be picked for each investigation. There must be one most applicable.

Among the philosophical assumptions, positivism is generally seen as the most workable and objective philosophy of science (Hawking, 2001). The specific principles of reasoning for positivism are also regarded as the most scientific and rigid (Donmoyer, 1999; Miles & Huberman, 1984). At its most extreme, positivists deem that the only valid accounts are those featuring objective, methodologically correct procedures, and that all other methods besides controlled, quantitative studies are biased (Carlshamre, 2010; Guba, 1990). This is to say, the social phenomenon can be examined in the same way as natural phenomenon are examined. Both are subject to the universal laws and generalizable.

However, positivism overlooks contextual sensitivity, and the holistic nature and complexities of social life. It has been criticised for its nature, and superficial and reductionist inclination, i.e. for holding that all "processes are reducible to physiological, physical or chemical events" and that "social processes are reducible to relationships between and actions of individuals" (Bullock & Trombley, 1999, p.669). Nonetheless, positivism does not agree with the realist perspective that there is only a single, definitive account of the social world. Nor does it agree with constructivists who maintain that there is more than one version of any account.

Many contemporary researchers argue that when determining strategies for data collection and interpretation, practical demands of the particular research problem are more important than paradigmatic philosophical assumptions (Bryman, 2006; Ko, 2010). Despite its claimed function of reducing biased interpretations of results, when explaining issues and phenomena a paradigmatic construct tends not to be persuasive enough. This may explain why paradigmatic assumptions are often found in methodological designs but not in discussions of substantive issues (Donmoyer, 1999). Such is true with this study, which relies on positivism tradition to direct the

methodological design and to test hypotheses.

3.2 Research design

This is a secondary study using data collected by Prof. Hallinger and his colleagues' project entitled Assessing the Contribution of Distributed Leadership to School Improvement (Missing Link II project, hereafter). Funded by the University Grant Council of Hong Kong, the project investigates the relationship between principal leadership and school improvement and student learning in Hong Kong primary schools. Hallinger's study is built on the knowledge base of Professor Allan Walker's Missing Link I project (formally entitled The Missing Link - School Leadership and Student Outcomes in Hong Kong Secondary Schools) targeting Hong Kong secondary schools.

Using part of the first wave teacher survey data, this study adopts a quantitative cross-sectional survey design to investigate the conceptual models postulated. The theoretical framework is built on school leadership and capacity, and teacher professional learning studies conducted in USA, Canada, UK, and Australia and Hong Kong. The study focuses exclusively on the impact of principal leadership on teacher professional learning through mediating effects of several school capacity factors. The cross-sectional design itself does not indicate any directionality of the relationships. The causal relationships proposed are based on theories from previous studies.

From the stage of research design, the selection of the school capacity factors as potential mediators are theoretically grounded and empirically supported by the literature (e.g., Bryk & Schneider, 2003; Danielson, 2006; Hoy & Miskel, 2008; Leonard, 2010; Scribner et al., 2007; Tschannen-Moran, 2000; Wahlstrom & Louis, 2008). Provided theoretical legitimacy of the mediators, a series of methodological issues are also considered. For instance, the sample size was calculated and assured large enough to ensure power of the mediation models (Fritz & MacKinnon, 2007;

Hoyle & Kenny, 1999). The contrast of the sizes of the correlations between the mediators and outcome variable, relative to those between the predictors and mediators, is another concern regarding possible multicolinearity that affects the power of mediation tests. Reliability of the measurement of the mediator is also considered. Such practical issues, which should be considered at research design stage, are seldom considered in previous mediation studies.

3.2.1 Sample

This study uses a convenience sample. An outline of the project (See Appendix A) and an invitation to participate were sent to over 600 primary school principals in September, 2011. 32 principals responded positively and signed the consent form (See Appendix B). The online questionnaire survey of teachers' perceptions of principal leadership practices and school capacity was administered online from October, 2011 to March, 2012. All teachers were invited by the principal to participate (refer to Table 4 for demographic profile for the participating schools and teachers). They could drop out at any time. Eventually 970 teachers responded to the questionnaire. The response rate of the teacher survey reaches 72.5%.

To conceal respondents' identity, numeric codes were provided for their random use. Respondents were expected to identify their job categories, but not required to input their names. Participants of the survey were key staff and general teachers from local primary schools. If respondents had taken administrative or management responsibility, they were classified as key staff. If they claimed they had none or very little administrative duty, they were classified as general teachers. Therefore, key staff include vice principals, administrative staff, and panel chairs or heads of departments. In Hong Kong schools, key staff members are usually active participants in the schools' improvement efforts. They represent "a pool of informants with a clear understanding of school policies and close awareness of leadership practices of the principals" (Day et al., 2009). While keeping in close touch with the principal, they

also interact with teachers and students on a daily basis. By contrast, general teachers focus on teaching tasks and have very little or no administrative duties. Perceptions of the principal's leadership practices from key staff and general teachers complement each other, thereby providing a fuller picture of principal leadership. In local primary schools, all staff members except the principal teach. In this sense, they are all regarded as teachers in this study.

3.2.2 Instruments

As part of the Missing Link II project, this study uses part of the first year's teacher survey data. Before answering survey questions, the participating teachers were asked to provide demographic information, i.e., gender, age, academic qualifications, experience of teaching in the present school (More than six months was counted as one year), and experience of the current role in the present school (More than six months was counted as one year). Participants were also asked to indicate their administrative role (if applicable) and subjects taught (See Part 1 of Appendix 2).

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 & Houtveen, 1999, p. 374). In this study two questionnaires are combined to survey how the teachers rated their principal's leadership practices and school capacity. The first questionnaire was adapted from Kwan and Walker's (2008) scale measuring the work of principals in Hong Kong secondary schools. The number of items was reduced to 33, excluding items that were not applicable to Hong Kong's primary schools. Seven dimensions of generic leadership practices are covered, namely, *Strategic Direction*, *Instructional Leadership*, *Teacher Professional Development*, *Staff Management*, *Resource Management*, *Quality Assurance*, and *External Communication*. Each dimension is measured by a set of three to eight items. For example, the dimension *Teacher Development* is measured by eight items, one of which is "Align staff professional

development activities with school development". The Likert scale is in a six-point form, (i.e., "not at all", "very little", "little", "partially", "a lot", "very significantly"), aiming to capture how teachers perceived about their principals' leadership practices over the past three years (refer to Part 2 of Appendix C).

The questionnaire used to measure school capacity was informed by Leithwood and Jantzi's (2000) and Allen and Meyer's (1990) scale surveying organizational conditions and school leadership. The four dimensions are *Trust, Communication, Collaboration*, and *Teacher Professional Learning.* The four dimensions are covered by a total of 21 items. The first three dimensions, i.e., *Trust, Communication,* and *Collaboration,* are all important and influential school capacity factors relating to human relations at school. The number of items in the dimensions varies from four to eight. For instance, an item to measure *Trust* is "We can freely discuss our feelings, worries, and frustrations". Sample items for *Communication* are "The principal always keeps colleagues informed about new school development" and "We have timely information to complete our jobs". The items "Our team members 'swim or sink' together" and "When our team members work together, we usually have common goals" are among the five items to measure *Collaboration* among staff. The Likert-type questions also has six response options (namely, "strongly disagree", "disagree", "somewhat disagree", "somewhat agree", "agree", and "strongly agree"), to capture the degree of agreement/disagreement the same group teachers had about their schools' capacity (refer to Part 3 of Appendix C).

*Teacher Professional Learning i*s singled out as the dependent variable in the study. It is measured through eight items. Samples items are "We provide and receive support from our colleagues to accomplish tasks", "Teachers in our school regularly discuss about possible ways to improve student performance", and "We share our best practices with other colleagues". Like the other school capacity factors, the Likert-type questions also have six response options (i.e., "strongly disagree", "disagree", "somewhat disagree", "somewhat agree", "agree", and "strongly agree") to measure the level of teacher professional learning in the schools.

3.3 Validation of the instrument

Data screening shows that all the survey items are answered, namely, no missing value is found. The analysis begins with testing of measurement properties of the instruments. Upon evidenced validity and reliability of the instruments, descriptive and inferential statistical analyses are conducted.

Seven dimensions of the *Principal Leadership* scale as confirmed through the Confirmatory Factor Analysis (CFA)

Considering that the principle leadership scale was well established and had been used in Hong Kong context in a series of recent studies (e.g., Lee, Walker, & Chui, 2012; Ko, Hallinger, & Walker, 2012; Kwan & Walker, 2008; Walker & Kwan, 2009, 2010), CFA are conducted directly using the default estimation method of Maximum Likelihood in Mplus Version 7 (Muthén & Muthén, 1998-2011).

Table 1 shows the proposed measurement model with 33 items measuring seven dimensions of *Principal Leadership* practices. The overall goodness-of-fit indices suggest that the seven-factor model fits the data reasonably well ($\chi 2$ = 1689.126, degrees of freedom = 474, *p-Value* = *.000*; TLI = .941, CFI = .947; RMSEA = .051, .054, SRMR = .031). [3] [4]

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[3] $\chi 2$ = Minimum Fit Function Chi-Square; df = Degrees of Freedom, TLI = Tucker Lewis Index, CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation, SRMR = Standardised Root Mean Residual.

[4] The model fit can be improved should modification be conducted. Nevertheless, it is considered unwise given that the initial model fits well, and the modification only lead to minor statistical remedy without refining the measurement structure (MacCallum , Browne, & Sugawara, 1996; Schreiber, Nora, Stage, Barlow, & King, 2006, p. 330).

Table 1

Results of Confirmatory Factor Analysis for the Principal Leadership Scale

Factor	Item No.	Factor Loading	SE	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Mean	SD
Strategic Direction	1	.853	.012	.728	.985	3.900	1.059
	2	.835	.015	.698	.985	3.709	1.102
α = .922	3	.897	.009	.805	.985	3.771	1.045
	4	.866	.011	.75	.985	3.766	1.111
Teacher Development	5	.892	.008	.796	.985	3.820	1.143
	6	.868	.010	.753	.985	3.774	1.145
α = .960	7	.905	.009	.819	.985	3.780	1.135
	8	.920	.007	.846	.984	3.789	1.130
	9	.874	.010	.765	.985	3.691	1.125
	10	.912	.007	.832	.984	3.805	1.123
Staff Management	11	.779	.017	.607	.985	3.735	1.140
	12	.831	.013	.691	.985	3.678	1.178
α = .914	13	.894	.009	.799	.985	3.663	1.155
	14	.800	.015	.639	.985	3.400	1.207
	15	.833	.012	.694	.985	3.648	1.175
External Communication	16	.824	.013	.680	.985	3.767	1.157
	17	.857	.012	.735	.985	3.694	1.154
α = .932	18	.879	.011	.773	.985	3.673	1.209
	19	.914	.008	.835	.984	3.631	1.164
Resource Management	20	.903	.008	.816	.984	3.709	1.127
	21	.859	.011	.738	.985	3.814	1.236
α = .929	22	.888	.009	.789	.985	3.703	1.171
	23	.857	.010	.734	.984	3.728	1.098
Quality Assurance	24	.884	.010	.782	.984	3.635	1.132
	25	.799	.016	.638	.985	3.685	1.176
α = .941	26	.893	.008	.797	.984	3.691	1.105
	27	.875	.010	.766	.985	3.699	1.130
	28	.848	.012	.719	.985	3.694	1.139
	29	.808	.015	.654	.985	3.578	1.149
Instructional Leadership	30	.893	.009	.798	.985	3.722	1.139
	31	.910	.009	.829	.984	3.719	1.146
α = .933	32	.925	.008	.856	.984	3.696	1.127
	33	.802	.019	.644	.985	3.890	1.160

Note.[5]

As shown in Table 1, the items have high factor loadings, ranging from .779 to .925 (all above the cut value, .70), and high squared multiple correlations, ranging from .638 to .856 (all above the cut value, .60) (Farrell, 2010; Hair, Black, Babin, Anderson, & Tatham, 2006). These partially show that the item-based model is well-supported by the sample, and all items are strongly related to the purported latent factors (Ko, 2010).

Given evidenced validity of the *Principal Leadership* scale, reliability tests for the individual dimensions and the whole scale are conducted to ensure the internal consistency of the scale. Column in the middle of Table 1 indicates what the internal reliabilities (Cronbach's alpha) of the dimensions will be if the item is deleted. Compared to the reliability coefficient with the items kept, the removal of the item

[5] All unstandardized factor loadings for the items are statistically significant ($p < 0.01$). The items are as follows. Item 1: Help clarify the reasons for our school improvement initiatives. Item 2: Give staff a sense of the overall purpose of the school. Item 3: Provide assistance to staff in setting goals for teaching and learning. Item 4: Integrate school priorities with the government policy agenda. Item 5: Help train the school management team. Item 6: Develop leaders amongst the teachers. Item 7: Promote a range of continuous professional development experiences for all staff. Item 8: Use coaching and mentoring to improve quality of teaching. Item 9: Encourage staff to think of learning beyond the academic curriculum. Item 10: Align staff professional development activities with school development. Item 11: Assign work to staff in accordance with their capabilities. Item 12: Show appreciation for teachers' outstanding performance. Item 13: Provide timely performance feedback to teachers. Item 14: Handle grievances amongst teachers. Item 15: Improve the performance appraisal system. Item 16: Maintain cooperative relationship with parents. Item 17: Engage parents in the school's improvement effort. Item 18: Develop strategies to promote the school to the community. Item 19: Establish a professional network with educational communities. Item 20: Allocate resources strategically based on student needs, Item 21: Demonstrate an ability to secure additional resources for the school. Item 22: Utilize support (auxiliary) staff for the benefit of student learning. Item 23: Provide or locate resources to help staff improve their teaching. Item 24: Establish a structured quality assurance mechanism in school. Item 25: Create a culture of accountability among teachers. Item 26: After observing classroom activities, work with teachers to improve their teaching. Item 27: Use student assessment data to inform school strategic planning. Item 28: Regularly observe classroom activities. Item 29: Regularly inspect student homework. Item 30: Initiate school-based instructional projects. Item 31: Encourage staff to consider new ideas for their teaching. Item 32: Design measures to improve student learning. Item 33: Articulate high expectations for student academic achievement.

will lead to a reduction of the reliability of the dimension. Integrated with the CFA results, it suggests that all the items in the *Principal Leadership* scale should remain.

Higher than the Cronbach's coefficient Alpha reliability for each dimension (ranging from .914 to .960), the reliability of the whole scale reaches a high of .985. These high reliability coefficients suggest that the factors and the whole scale are good in terms of internal consistency. In addition to the high internal consistency, the more-than-acceptable overall reliability suggests that, the different dimensions might measure the same construct.

Table 1 also reports mean scores and standard deviations of teachers' ratings of *Principal Leadership* at item level. All item mean scores are above the mid-point, 3.5, of the six-point Likert scale, indicating that on the whole teacher perceptions of their principal's leadership practices are positive.

Four dimensions of the *School Capacity* scale as confirmed through the CFA

The confirmatory factor analyses are conducted with the four school capacity factors in schools, also using the Maximum Likelihood estimation method of Mplus Version 7 (Muthén & Muthén, 1998-2011). A measurement model of the four latent variables with all but two of the 21 items is identified, and is termed as relational school capacity scale, and school capacity scale for short.

The measurement models are constructed in stages due to the necessity to refine measurement structure of the model (Schreiber, Nora, Stage, Barlow, & King, 2006). In School Capacity Model 1 (SC1 hereafter; and SC2, SC3, and SC4 in turn for the other three measurement models), all the items are kept and no modification is made. The modification index reveals high coviances between Item 5 ("Meetings in our school are effective and efficient") and Item 6 ("There are a reasonable number of meetings in our school") under the purported factor *Communication*. When coviances of these two closely related items are fixed in Model SC2, the overall goodness-of-fit

indices improves. Removal of Item 21 ("The school timetable provides adequate time for collaborative teacher planning") under the purported factor *Teacher Professional Learning*, which shows the lowest factor loading and which overlaps theoretically with the construct *Collaboration*, witnesses a noticeable decrease of the RMSEA values in Model SC3. Further removal of Item 4 ("We can freely discuss our feelings, worries, and frustrations"), the other low loading item which does not necessarily contribute toward the measurement of *Trust*, in Model SC4 leads to a further significant improvement of the fit statistics, especially, RMSEA and SRMR. As shown in Table 2, the contrast between the four measurement models suggests that, with 19 items Model SC4 demonstrates the best model fit and most justifiable theoretical structure.

Table 2

Fit Statistics of the School Capacity Measurement Model

Model	χ2	*df*	*p-Value*	TLI	CFI	RMSEA	SRMR
SC 1	1061.569	183	.000	.896	.910	.070	.076
SC 2	954.393	182	.000	.908	.921	.066	.074
SC 3	763.868	163	.000	.924	.935	.062	.068
SC 4	490.632	145	.000	.953	.960	.050	.036

Note. χ2 = Minimum Fit Function Chi-Square; df = Degrees of Freedom, TLI = Tucker Lewis Index, CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardised Root Mean Residual.

Table 3

Results of Confirmatory Factor Analysis for the School Capacity Scale

Factor	Item No.	Factor Loading	Error Variance	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Mean	SD
Trust α = .817	1	.882	.014	.778	.683	4.794	.789
	2	.885	.013	.784	.679	4.720	.795
	3	.601	.034	.361	.880	5.219	.905
Communica -tion α = .863	5	.738	.018	.545	.802	3.727	1.289
	6	.628	.026	.395	.840	3.763	1.298
	7	.874	.014	.764	.811	4.062	1.082
	8	.809	.017	.654	.843	4.282	1.075
Collaboratio n α = .932	9	.809	.018	.654	.924	4.436	.868
	10	.804	.018	.647	.925	4.592	.903
	11	.836	.021	.699	.919	4.408	.849
	12	.919	.012	.844	.907	4.462	.817
	13	.921	.009	.848	.907	4.427	.865
Teacher Professiona l Learning α = .922	14	.748	.018	.56	.916	4.476	.951
	15	.818	.015	.669	.908	4.493	.851
	16	.816	.015	.666	.909	4.492	.872
	17	.853	.014	.728	.903	4.477	.852
	18	.806	.017	.650	.908	4.639	.870
	19	.802	.018	.644	.909	4.554	.821
	20	.731	.019	.535	.917	4.175	.958

Note.[6]

[6] All unstandardized factor loadings for the items are statistically significant ($p < 0.01$). The

As presented in Table 3, the standardized factor loadings are between .601 and .919, suggesting that all the items are moderately or strongly associated with the purported latent factors. Square multiple correlations range from .535 to .844, apart from the substantially low ones, .361 for Item 3 and .395 for Item 6.

Provided evidenced validity of the school capacity scale, reliability tests for the dimensions and the whole scale are conducted to ensure the internal consistency. In Table 3 the column in the middle indicates what the internal reliability of the dimension will be if the item in the line is removed. For example, compared to the reliability coefficient for each dimension with all items under it, the removal of Item 3 will lead to an increase of the reliability for the dimension *Trust* from .817 to .880. Considering that reliability of this three-item factor, *Trust*, has reached a reasonable high of .817, and removal of Item 3 will reduce the measurement capacity of the factor *Trust*. Therefore, Item 3 is kept. Item 6 is also kept in the scale, due to the fact that removal of it does not improve the reliability of the factor *Communication*. Also higher than the Cronbach's coefficient alpha reliability for each dimension (Cronbach's alpha range from .817 to .932), the reliability of the whole scale reaches .938, suggesting that the factors and the whole scale are good in terms of internal consistency.

Table 3 also reports means and standard deviations of teachers' ratings of school capacity at item level. All item mean scores are above the mid-point, 3.5, of the six-point Likert scale, indicating that on the whole teacher perceptions of their principal's leadership practices are positive.

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items are as follows. Item 1: We handle our work with competence and confidence. Item 2: We approach our work professionally. Item 3: We do not try to gain an advantage by deceiving others. Item 4: We can freely discuss our feelings, worries, and frustrations. Item 5: Meetings in our school are effective and efficient. Item 6: There is a reasonable number of meetings in our school. Item 7: We have timely information to complete our jobs. Item 8: The principal always keeps colleagues informed about new school. Item 9: Our team members 'swim or sink' together. Item 10: Our team members want each other to succeed. Item 11: Our team members seek compatible goals. Item 12: The goals of team members go together. Item 13: When our team members work together, we usually have common goals. Item 14: We provide and receive support from our colleagues to accomplish tasks. Item 15: Teachers in our school regularly discuss about possible ways to improve student performance. Item 16: Teachers are encouraged to develop and implement new practices. Item 17: We share our best practices with other colleagues. Item 18: There is ongoing collaboration among teachers in the same subject panel. Item 19: We can accomplish more through working in small teams. Item 20: There is ongoing collaboration among teachers in different subject panels, Item 21: Our school tries to nurture a positive learning environment.

3.4 Data collection procedures and ethical issues

The author joined the Missing Link II project from the period of instrument compilation and data collection. The questionnaire survey of teachers' perceptions of their principal's leadership practices and school capacity, etc., was administered online from September to October, 2011 after the consent forms with the signature of principals from the 32 schools being received. First a pilot study was conducted with 4 schools in December, 2011. Preliminary analysis of the data from the pilot study proved validity and reliability of the survey instruments. The data collection for the main study started from November, 2011 and finished in March, 2012.

This study follows the operational guidelines regarding Human research ethics and codes (HREC) set by Hong Kong Authorities and advocated by the Hong Kong Institute of Education. Before the survey, school and participants were informed of the aims and objectives of the research, as well as the procedures and outcomes intended. Both schools and teachers had the right to withdraw without prejudice at any stage of the research. They would not be penalized if they decided not to do the survey. Also they were not forced, induced or persuaded to participate. They could reject to answer any questions in the survey. All information is treated confidentially in the data collection, storage and dissemination procedures. Measures were taken in case any potential risk may violate the participants' rights of privacy and confidentiality.

Prof. Philip Hallinger, the principal investigator, formally allowed the author to use part of the survey data for the doctoral thesis. As a secondary data user, the author also followed the academic ethics and codes, and took measures to ensure confidentiality of the data.

1. All information and data the author was allowed to use would not be accessed by any other individuals or agencies. Information and data in digital form had been archived and saved in the author's computer, with restricted access. The hard copies were locked in the author's private cabinets, and would be destroyed

after completion of the thesis in compliance with the Institute's codes. The author would take the responsibility in case of any improper disclosure or use of the information.

2. The code of anonymity and confidentiality were observed. To keep the school identity and participants' responses confidential, account numbers were used during data collection and analysis. Therefore no teacher responses could be traced and matched with the school information. Information regarding the schools was not revealed in the real names. The research output was strictly used for the doctoral thesis.

In brief, this study follows the guidelines on ethics in research and the guidelines stipulated by relevant research domains. On the basis of informed consent, there is not any coercion on the part of the investigator, neither any deception. There is no prolonged and repetitive testing, nor sensitive information regarding participants' behaviors, e.g., illegal conduct, sexual behavior, or drug and alcohol abuse.

3.5 Analytical framework

Prior to the descriptive and inferential statistical analyses, confirmatory factor analyses (CFA) were conducted to validate the survey instruments.

Next, teachers' perceptions of principal leadership, school capacity and teacher professional learning in their schools are examined through descriptive and comparative statistics (e.g., mean, standard deviation, skewness, and kurtosis). Relative variability identified from the frequency distribution of the factors is put under close scrutiny. Correlational analyses are also conducted to identify the extent to which the factors are related to each other.

Next simple mediation analyses are adopted to assess potential mediating effects of the school capacity factors, individually, on the relationship between principal leadership practices and teacher professional learning in local schools. Provided the presence of mediating effects of the school capacity factors, significance and strengths of them are accessed. Afterwards, multiple-mediator analysis with *Principal*

Leadership as the single predictor is conducted to compare mediating power of the school capacity factors. To move a step further, used as multiple predictors the seven dimensions of *Principal Leadership*, together with the three parallel mediators, set up the framework for multiple-predictor-and-multiple-mediator analysis. The bootstrapping method is again used to assess strengths and ratios of mediated effects of the individual leadership dimensions.

Summary

Chapter Three begins with philosophical assumptions of the study. It then introduces the research design, including sampling and instrumentation. Afterwards, the procedures for instrument validation are reported in detail. Next it moves to the procedures for data collection and research ethics. Finally the framework of data analysis is illustrated. The results of data analysis and verification of hypotheses will be unfolded in Chapter Four.

CHAPTER 4
DATA ANALYSES AND RESULTS

Introduction

This chapter aims at testifying mediating effects of the three school capacity factors on the relationship between *Principal Leadership* practices and *Teacher Professional Learning* in Hong Kong primary schools. It contains four sections. The demographic profiles of the participating schools and teachers are illustrated in Section One. Section Two introduces the procedures of data analyses. Section Three reports the findings of the descriptive and comparative analysis on teachers' perceptions of *Principal Leadership*, *Trust*, *Communication*, *Collaboration*, and *Teacher Professional Learning* in the schools, and the association between them. Section Four elaborates the processes of the mediation analyses and reports the results.

4.1 Demographic profiles of the participating schools and teachers

Table 4

Demographic Information for the Participating Schools and Teachers

School Demographics (N=32)					
District	Hong Kong	Kowloon	New Territories		
	3 (9.4%)	14 (43.8%)	15 (46.9%)		
School Type	Aided	Direct Subsidy	Government	Private	
	28 (87.5%)	1 (3.1%)	1 (3.1%)	2 (6.2%)	
Respondent Demographics (N=970)					
Gender	Male		Female		
	200 (20.6%)		770 (79.4%)		
Age	24 and below	25 - 34	35 - 44	45 - 54	55 or above
	19 (2.0%)	362 (37.3%)	371 (38.25%)	180 (18.6%)	38 (3.9%)
Academic Qualification	Certificate	Bachelor's	Master's		Doctoral
	37 (3.8%)	619 (63.8%)	311 (32.1%)		3 (.3%)
Current Role	Vice Principal	Administrative Staff	Panel Chair		General Teacher
	29 (3%)	169 (17.4%)	213 (22%)		559 (57.6%)
Year	0-3	4-7	8-11	12-15	16-19	20 years or above
Experience of Teaching in Present School	217 (22.4%)	256 (26.4%)	150 (15.5%)	159 (16.4%)	91 (9.4%)	97 (10%)
Experience of Current Role in Present School	329 (33.9%)	287 (29.6%)	147 (15.2%)	107 (11%)	49 (5.1%)	51 (5.3%)

The demographic information about the school and respondents (see Table 4) allows the author to create a profile. The 32 participating schools approximately account for

6% of the total number of Hong Kong primary schools. The low participation rate is not surprising, referring to some other Hong Kong-based studies (e.g., Walker & Ko, 2012; Lee, Walker, & Chui, 2012). The low school participation rate in Hong Kong might be attributed to the collection of student achievement data, which is not used in this study. Principals may still have concerns that the school information will be matched and found out, which will potentially leave their schools at a competitive disadvantage.

The overall response rate of the teacher survey reaches 72.5%. More than half of the schools had over 80% of their teaching staff participate. The response rate of a few schools is particularly high with nearly all their teaching staff involved. Conversely, the response rate for another few schools is especially low, though the principals had taken effort to encourage and invite as many teachers as possible. It might be due to the fact that the teachers had too heavy workload to manage this extra task, or they still had concerns about the confidentiality of their identity. By and large, the overall response rate is high enough to represent the total number of teaching staff in local primary schools.

Despite a convenience sample, a glance over the school profiles shows that the sampled schools are good representatives in terms of school location, teacher experience, and students' socio-economic background. In Hong Kong, the school location is an indicator of school SES. In our sample, three schools are located in Hong Kong Island, 14 in Kowloon, and 15 in New Territories. Aided schools account for 87.5% of the total, outnumbering schools of other types substantially. The seemingly uneven distribution of schools by types (private schools and public schools, the latter including government, aided, and direct subsidy scheme school) reveals a similar distribution of school types in local primary schools (Li, Hallinger, & Ko, submitted). In brief, though not a random sampling, profile of the participating schools represents the key school characteristics, school location, thereby school SES, and school type. 80% of the respondents were female, partially due to the fact that an overwhelming majority of primary school teachers were and still are female in Hong Kong. Respondents, who were aged over 25 but below 45 when the data were collected, comprise over 75.5% of the sample. Over 63% of the respondents held

bachelor's degrees; and 32% held master's degrees.

77% of the respondents had taught in their present schools for more than 3 years, and over 66% had taken their current administrative role in the schools for more than 3 years. Although participants who had taught in the school for relatively a short time (less than 3 years) and who had taken their current administrative role in the school for less than 3 years account for a noticeable percentage of the total sample (22.4% and 33.9%, respectively), the portions of working year groups are reasonably distributed. This suggests a comprehensive coverage of teachers and their perceptions of the principal and school.

Taken together, most respondents are experienced teachers, who had worked for considerably sufficient time in their current schools. This increased the likelihood that they could provide a more reliable account of the leadership practices and school capacity and teacher professional learning in their schools. The responses from less experienced teachers provide complementary information, hence a more comprehensive picture on the whole. However, it should be noted that, the self-reported data may not reflect all real information, which is the concern with all survey studies of the like.

4.2 Data analyses

The overall conceptual framework established in Chapter Two outlines the width and scope of inquiries. The theoretical models posit both direct and indirect effects of *Principal Leadership* on *Teacher Professional Learning* through *Trust, Communication*, and *Collaboration*. This section describes the overall data analysis approaches, based on the conceptual framework. The data are analyzed using raw measures and a variety of statistical methods. Given that the two scales have been validated through confirmatory factor analyses and reliability tests, descriptive and comparative analyses are used to explore teachers' perceptions of *Principal Leadership*, *School Capacity*, and *Teacher Professional Learning* in Hong Kong primary schools. What follows are mediation analyses to test potential mediating

effects of *Trust*, *Communication*, and *Collaboration* on the relationship between *Principal Leadership* and *Teacher Professional Learning* in local schools. Provided the affirmed presence, significance and strengths of the mediating effects are examined and compared.

To answer Question 1 regarding the teacher perceived association of *Principal Leadership*, *School Capacity*, and *Teacher Professional Learning*, factor level descriptive information are used for an insight of the constructs. Histograms and scatter plots are provided for quick and easy visual comprehension. The association of the constructs is also supported through Pearson's bivariate correlations.

Questions 2 to 4 are first answered through independent simple mediation analyses, following Baron and Kenny's (1986) four-step linear regression approach and integrated with the bootstrapping method.[7] Effects of the composite measure of *Principal Leadership* on *Teacher Professional Learning* via the individual mediators are examined first. Significance of the indirect effects is tested also using the bootstrapping method.[8] Next, the seven dimensions of *Principal Leadership* are used as multiple predictors. Indirect effects of them on *Teacher Professional Learning* through the individual mediators are also examined. Leadership dimensions that have significant direct, indirect, or total effects on *Teacher Professional Learning* are identified, sizes of the effects compared.

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[7] Baron and Kenny (1986) propose a four-step regression approach to test the potential mediating effects. Significance of the regression coefficients is examined at each step. If the effect of the predictor remains significant after controlling for the mediator, significant effects of the mediator is declared.

[8] To test the significance of mediated (or indirect) effect, Sobel (1982) develops a test, based on the normal theory approach. However, MacKinnon, Lockwood, Hoffman, West and Sheets (2002) question the adequacy of normal distribution for significance assessment of the mediating effects. Preacher and Hayes (2004) also reiterate the incorrect assumption of normality of the mediating statistics. Instead, they recommend the use of the bootstrapping method as a more robust alternative (Hayes, 2013; Mooney & Duval, 1993) for the assessment of statistical significance. Bootstrapping yields ratios and sizes of the direct, indirect, and total effects for relevant paths in the tested model. This advance in analytical methodology strengthens 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 resampling the data (Hayes, 2013). Following this logic, the bootstrapping method is employed to assess the significance of relationships among the variables.

To answer Question 5, multiple mediator analyses are implemented first with the composite of *Principal Leadership*. [9] Upon the establishment of the single-predictor-multiple-mediator model, effects of the seven leadership dimensions, as multiple independent variables, via the multiple mediators, are examined and compared.

4.3 Descriptive Analysis

4.3.1 How are *Principal Leadership*, *School Capacity* (i.e., *Trust*, *Communication*, and *Collaboration*), and *Teacher Professional Learning* related, as the teachers perceived?

4.3.1.1 How are *Principal Leadership*, *School Capacity* (i.e., *Trust*, *Communication*, and *Collaboration*), and *Teacher Professional Learning* perceived by the Hong Kong primary school teachers?

This study has a valid sample of 970 teachers from Hong Kong primary schools. No missing values are identified. Tables and histograms are used to demonstrate descriptive patterns of the responses at scale and factor level.

As shown in Table 5, the composite mean of principal leadership, 3.72 is slightly above 3.5, the midpoint of the 6-point Likert scale (1 for the lowest and 6 for the highest), suggesting a positive feedback from survey participants on the whole. The negative skewness reaches a significant level (skewness: -.590, standard error of skewness: .079), implying again that the majority of the ratings are above the mean score. This is also evident that both the median (3.86) and the mode (4) are above the

[9] The multiple mediator analyses extend and supplement the few simple mediating analyses. In contrast with the simple mediating models, the multiple mediator models include more variables, thereby reducing the risk of biased parameter estimating (Judd & Kenny, 1981). In addition, multiple mediator analyses also report relative strengths of the effects associated with all mediators, thus comparable (Preacher & Hayes, 2008).

mean score. The kurtosis reaches a positively significant level (kurtosis: .474, standard error of kurtosis: .157), suggesting that the number of ratings around the mean score is larger than normal.

Characteristics of the seven dimensions underlying the validated *Principal Leadership* scale are shown in Table 5. The generic practice of *Principal Leadership* is illustrated by the seven dimensions of practices. Variabilities across the dimensions are considered as differentiated *Principal Leadership* practices. For the seven dimensions, all the modes and medians are above the mean scores, and the mean scores are above the midpoint of the six-point scale, 3.5. These indicates that most teacher perceptions are positive and above the average. All the dimensions have significantly negative skewness values, which again evidence the positive teacher ratings. All the kurtoses are positive, meaning that the number of ratings around the mean score is larger than normal. The centeredness of ratings for the first two dimensions reaches a significant level, suggesting a high probability for extreme ratings.

Table 5 *Descriptive Statistics of the Seven Dimensions of Principal Leadership Practice*

Descriptive Statistics of the Seven Dimensions of Principal Leadership Practice

	Mean	Std. Deviation	Median	Mode	Skewness	Z-Skewness	Kurtosis	Z-Kurtosis
Principal Leadership	3.72	.94	3.86	4.00	-.59	.08	.47	.16
Strategic Direction	3.79	.97	4.00	4.00	-.71	.08	.65	.16
Teacher Development	3.78	1.03	4.00	4.00	-.60	.08	.32	.16
Staff Management	3.62	1.01	3.80	4.00	-.41	.08	.11	.16
External Communication	3.69	1.07	4.00	4.00	-.47	.08	.11	.16
Resource Management	3.74	1.05	4.00	4.00	-.58	.08	.22	.16
Quality Assurance	3.66	1.00	3.83	4.00	-.52	.08	.27	.16
Instructional Leadership	3.76	1.04	4.00	4.00	-.57	.08	.23	.16

Figure 5 shows a roughly bell shaped distribution of the teachers' overall ratings on their principals' leadership practices. The longer tail on the left hand side of the histogram proves that more ratings are higher than the mean score, hence positive feedback from the respondents. The peaked and centered ratings are evidence of the significantly positive kurtosis values, meaning that the ratings are higher than the mean scores instead of scattering around. On the other hand, platykurtic distribution patterns, i.e., highly centered or peaked kurtosis values, suggest the existence of extreme ratings.

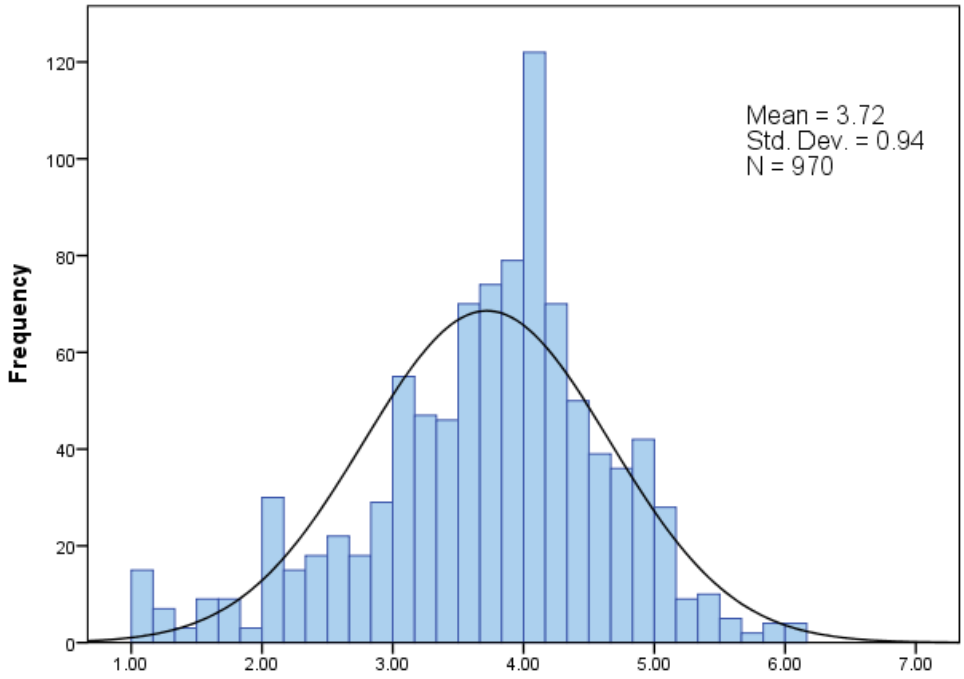

Figure 5 Relative Variability Identified in the Frequency Distribution of the Composite Variable Principal Leadership

Table 6. *Descriptive Statistics of the Four Dimensions of School Capacity*

Dimension	Mean	Std. Deviation	Median	Mode	Skewness	Z-Skewness	Kurtosis	Z-Kurtosis
Trust	4.91	.71	5.00	5.00	-1.30	.08	3.81	.16
Communication	4.02	1.00	4.00	5.00	-.68	.08	.19	.16
Collaboration	4.46	.76	4.60	5.00	-.84	.08	2.18	.16
Teacher Professional Learning	4.47	.73	4.57	5.00	-.94	.08	2.32	.16

Characteristics of the four dimensions underlying the validated school capacity scale are shown in Table 6. Likewise, for the three human relational dimensions almost all the modes and medians are above the mean scores, and the mean scores are above the midpoint of the six-point scale, 3.5. These suggest that most teacher perceptions about their school capacity are above the average and positive. In the similar vein, all the dimensions have significantly negative skewness values, which again evidences

the positive teacher ratings. All the kurtoses are positive and significant, meaning that the number of ratings around the mean score is larger than normal. However, the centeredness of ratings suggests a high probability for extreme ratings.

Next an examination of histograms of the three human relational factors reveals the magnitude of variation and characteristics of social capacity in these schools (see Figure 6). Take *Trust* as an example, the few much lesser peaks in the distribution pattern suggests limited variability in ratings across the respondents – respondents from some schools rated distinctively high, and those from some other schools rated identifiably low regarding the establishment of trust in their schools.

The lowest possible value for this factor is 1. Only 3 respondents (.3%) strongly disagreed there was trust in their schools. A value of 2 suggests moderate disagreement. No people held this opinion. A value of 3 suggests slight disagreement of 22 people (2.3%). A value of 4 implies that the 92 teachers (9.5%) slightly agreed on the existence of trust in their schools. A value of 5 suggests that 31.3% the ratings are averaged out towards a neutral position (mean =4.91) for 304 teachers. The highest possible value for this factor is 6. 88 (9.1%) of the respondents strongly agreed that there was trust in their schools. On the whole, people who were positive constitute over 85% of the total sample. 4 teachers rated lower than 3, hence the 1.44% of outliers.

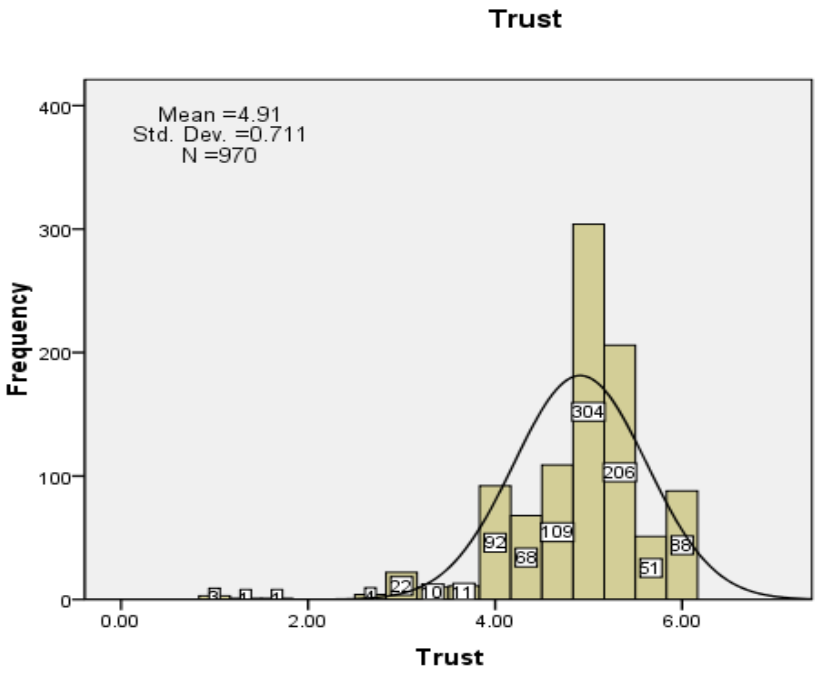

Figure 6 Relative Variability Identified in the Frequency Distribution of the Dimension Trust

By contrast, the factor *Communication* has a much lower mean and median than the other two school capacity factors. As shown in Figure 7, the lowest possible value for the factor *Communication* is 1. 11 respondents (1.1% of the total) strongly disagreed that communication existed in their schools. A value of 2 means that, on average respondents moderately disagreed that there was communication in their schools. 19 (2%) Teachers thought so. A value of 3 means that on average the 75 (7.7%) respondents slightly disagreed that there was communication in their schools. A value of 4 may mean that 14.3% the ratings were averaged out towards a neutral position (mean =4.02) for 139 teachers. A value of 5 may mean that 19.5% (189) respondents moderately agreed that there was communication in their schools. The highest possible value for this factor is 6, meaning that 13 (1.3%) teachers strongly agreed that there was communication in their schools. On the whole, people who were positive in this regard constituted over 90% of the total sample. 11 ratings are out of the normal distribution and regarded as outliers.

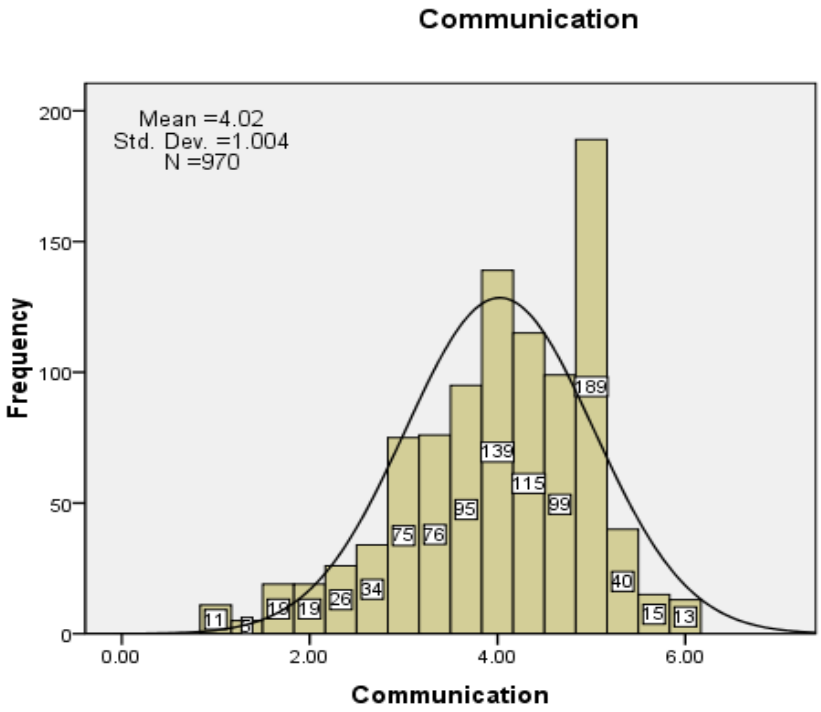

Figure 7 Relative Variability Identified in the Frequency Distribution of the Dimension Communication

The bimodal distribution pattern of ratings for the factor *Collaboration* (see Figure 8) represents the other two factors partially, considering the negative but less significant skewness (-.84) and significantly positive kurtosis (2.18). The lower centeredness and relatively high variability of the ratings are evidenced in the histogram. Extreme values are identified but represent a small proportion.

The lowest possible value for this factor is 1. Only .5% respondents strongly disagreed that there is collaboration between colleagues in their schools. A value of 2 means that, on average respondents moderately disagreed that there was collaboration in their schools. Only 3 (.3%) people thought so. A value of 3 means that the 21 (2.2%) respondents slightly disagreed that there was collaboration in their schools. A value of 4 may mean that 20.6% (200) of the respondents showed slight agreement on the existence of collaboration in their schools. A value of 5 means that 28.7% (278) respondents moderately agreed that there was collaboration in their schools. This group, together with the group opted for the slight agreement (the value

4), are represented by the bimodal curves. The highest possible value for this factor is 6, meaning that 33 (3.4%) teachers strongly agreed that the colleagues do collaborate. On the whole, people who were positive in this regard constituted over 95% of the total sample. Eight ratings are below 2 and are out of the bimodal distribution, thereby being regarded as outliers.

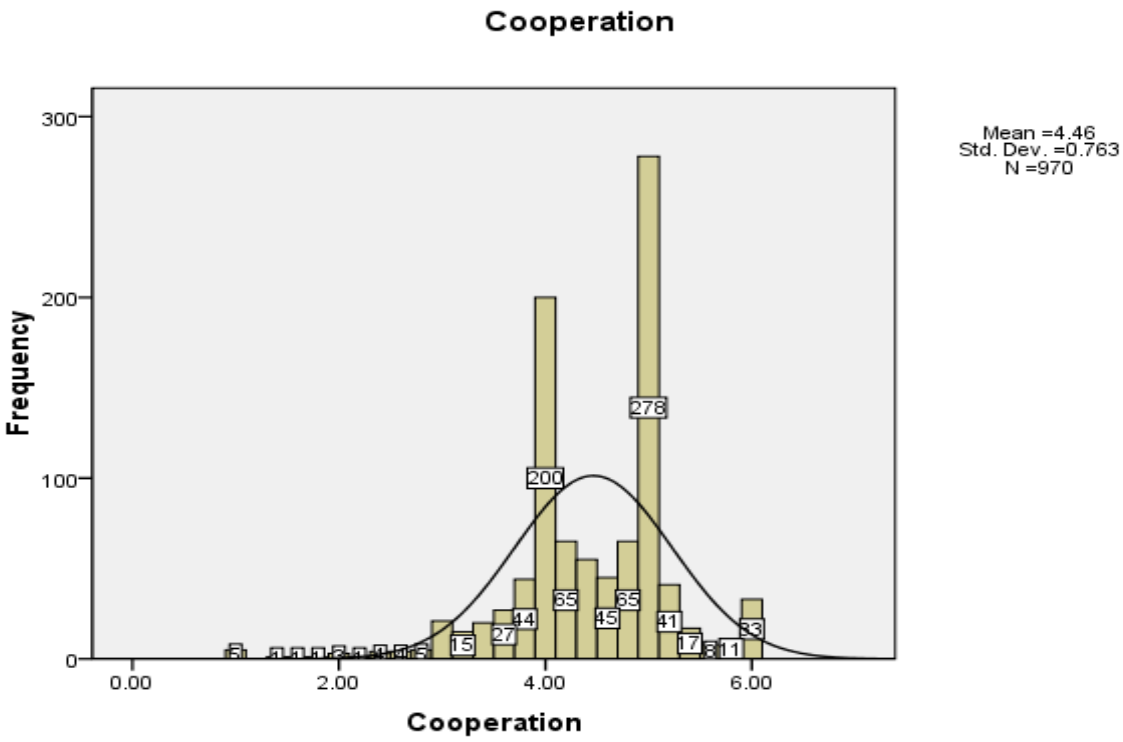

Figure 8 Relative Variability Identified in the Frequency Distribution of the Dimension Collaboration

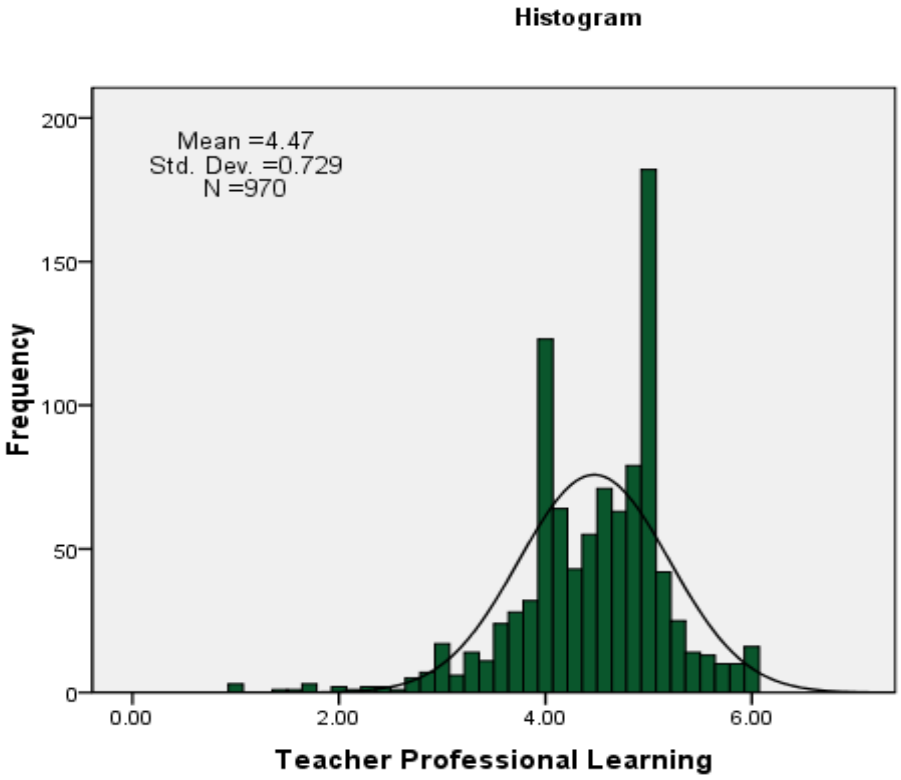

Figure 9 Relative Variability Identified in the Frequency Distribution of the Variable Teacher Professional Learning

Variation of *Teacher Professional Learning* is defined as variability found in the teacher's perceptions of *Teacher Professional Learning* in the schools. The composite mean is 4.47, high above 3.5, the midpoint of the 6-point Likert scale. The mode and median (4.57 and 5) are both higher than the mean score. Figure 9 suggests that, most ratings are above the mean scores, considering the significantly negative skewness (skewness: -.94, and standard error of skewness: .08). That is to say, the participating teachers generally have positive and high above average ratings in terms of *Teacher Professional Learning* in their schools. Most ratings are centered around the mean score, while the centeredness of ratings reaches a significant level. The kurtosis reaches a positively significant level (kurtosis: 2.32, and standard error of kurtosis: .16), suggesting that the number of ratings around the mean score is larger than normal.

In Figure 9 bimodal curves are found, indicating that, there is another option, the

popularity of which is next to the mode 5 that 18.8% of the respondents who moderately agreed with the status of *Teacher Professional Learning* in their schools opted for. In fact, the second largest group of people selected the option "agree moderately" by the value of 4, constituting 12.7% of the total. Extreme values are identified but represent relatively small proportions, especially at the lesser end.

In closing, the findings that on average the teacher respondents gave above-midpoint ratings on *Principal Leadership*, *School Capacity*, and *Teacher Professional Learning* in their schools suggest positive feedback from teachers in the areas concerned. They agreed that their principals had the values, knowledge, skills and attributes for school development, the schools had established capacity in terms of *Trust*, *Communication* and *Collaboration,* and *Teacher Professional Learning* in their schools. The identification of extreme values implies that there are teachers who gave either extremely low or extremely high ratings. However, the proportion of extreme values is small enough to be ignored. Their existence will not disturb the general pattern of the findings.

4.3.1.2 How are *Principal Leadership*, *School Capacity*, and *Teacher Professional Learning* related?

Although the teachers' perceptions on *Principal Leadership*, *School Capacity*, and *Teacher Professional Learning* are independent of each other, when the perceptions are considered together, the interrelatedness of them tells the story. In this section, the interrelation of the perceived areas included in this study is first observed from Pearson's bivariate correlations. Next, scatter plots ranked by the mean scores of *Teacher Professional Learning* of the 32 schools provided supplementary information.

Table 7

Bivariate Correlations, Means, Standard Deviations, and Reliabilities for the Principal Leadership (Factors and Composite Scores), School Capacity, and Teacher Professional Learning

Factor/Scale	1	2	3	4	5	6	7	8	9	10	11	12	*M*	*SD*	*Reliability*
1. *Principal Leadership*	--	.872**	.914**	.908**	.923**	.937**	.937**	.924**	.137**	.298**	.273**	.274**	3.72	.94	.985
2. *Strategic Direction*		--	.844**	.726**	.741**	.750**	.775**	.774**	.064**	.157**	.145**	.146**	3.79	.97	.922
3. *Teacher Development*			--	.810**	.779**	.808**	.817**	.807**	.117**	.271**	.231**	.247**	3.78	1.03	.960
4. *Staff Management*				--	.837**	.851**	.819**	.781**	.172**	.355**	.321**	.313**	3.62	1.01	.914
5. *External Communication*					--	.887**	.846**	.822**	.133**	.289**	.262**	.264**	3.69	1.07	.932
6. *Resource Management*						--	.860**	.849**	.143**	.306**	.275**	.268**	3.74	1.05	.929
7. *Quality Assurance*							--	.894**	.131**	.266**	.257**	.253**	3.66	1.00	.941
8. *Instructional Leadership*								--	.119**	.260**	.254**	.265**	3.76	1.04	.933
9. *Trust*									--	.457**	.595**	.736**	4.91	.71	.817
10. *Communication*										--	.641**	.657**	4.02	1.00	.863
11. *Collaboration*											--	.761**	4.46	.76	.932
12. *Teacher Professional Learning*												--	4.47	.73	.922

Table 7 displays Pearson correlation coefficients between the dimensions and composites of *Principal Leadership*, *Trust*, *Communication*, *Collaboration*, and *Teacher Professional Learning*. All the dimensions of *Principal Leadership* practices are highly inter-correlated, ranging from .726 to .894, suggesting the possibility of colinearity or interaction. By contrast, the inter-correlations among the school capacity factors, i.e., *Trust*, *Communication*, and *Collaboration*, are at a medium level (ranging from .457 to .641), suggesting good discriminating power.

Among the three school capacity factors, the correlation between *Trust* and the composite *Principal Leadership* is as low as .137, lower than that between *Communication* and *Principal Leadership* (.298) and that between *Collaboration* and *Principal Leadership* (.273). The lower correlation between *Principal Leadership* and *Trust* and that between *Trust* and *Teacher Professional Learning* imply weaker effects of *Trust* as a potential mediator between *Principal Leadership* and *Teacher Professional Learning*, as compared to the potential mediators *Communication* and *Collaboration*.

The dimension *Teacher Professional Learning* is singled out as the outcome variable in the subsequent mediation analysis. The correlation between *Teacher Professional Learning* and *Principal Leadership* is significant but as low as .274, suggesting low direct relationship between these two. Whilst correlations between *Teacher Professional Learning* and *Trust*, *Communication*, and *Collaboration* are as high as .658, .684, .761 respectively, indicating facilitating functions of these potential mediators.

Correlations across *Teacher Professional Learning* and *Principal Leadership* dimensions are significant but generally low, ranging from .146 to 313. The lowest is with *Strategic Direction*, and the highest with *Staff Management*. It also shows a similar pattern for correlations between the *Principal Leadership* dimensions with *Trust*, *Communication*, and *Collaboration* (.064 to .355). In addition, correlations between *Teacher Professional Learning* and principals' *Teacher Development* and *Instructional Leadership* (.247 and .265, respectively) are not noticeably higher than other principal leadership dimensions. Considering the much higher correlations with *Teacher Professional Learning*, *Trust*, *Communication*, and *Collaboration* may

function as mediators between the *Principal Leadership* dimensions and *Teacher Professional Learning.*

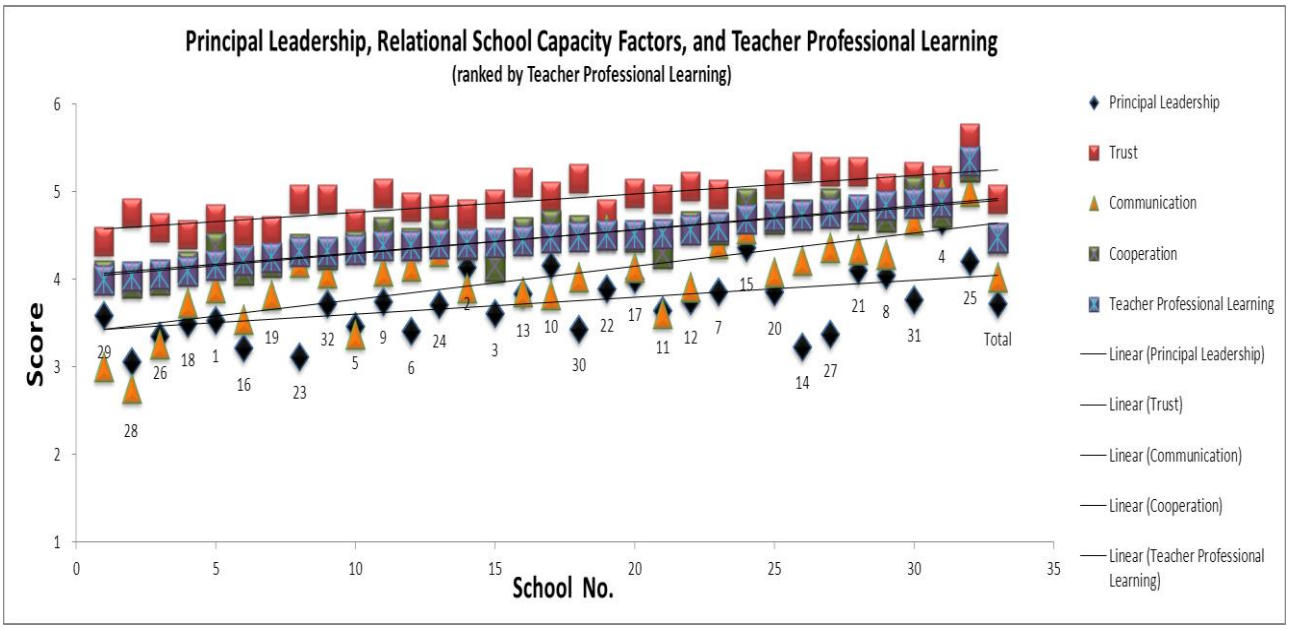

Figure 10 The Mean Scores of Principal Leadership (the Composite Score), Trust, Communication, Collaboration, and Teacher Professional Learning (Ranked by Teacher Professional Learning)

The correlations in Table 7 show similar tendency with the graphic patterns in Figure 10. When ranked from high to low by teachers' perceptions of *Teacher Professional Learning* in their schools, the ratings of *Principal Leadership* generally follow the upward trend but fluctuate tremendously. Information revealed by the visual image partly explains the significant but low correlation (.274) between *Principal Leadership* and *Teacher Professional Learning*. However, it should be noted that, the bivariate correlations are based on all the 970 cases. However, displayed in Figure 10 and 11 are the mean scores aggregated to school level.

Fluctuating to a lesser degree, teachers' ratings of *Trust* are generally higher than those of *Communication* and *Collaboration*. The ratings, as well as the linear trend line, of *Collaboration* almost overlap that of *Teacher Professional Learning*, indicating that they are most closely related, as evidenced by the highest and significant correlation (.761).

Unlike the other two social factors, the trend line of *Communication* does not keep parallel to that of the *Teacher Professional Learning*. In addition, when aggregated to school level, the ratings of *Communication* are considerably lower than those of *Trust* and *Collaboration*. On the whole, the fluctuation of *Trust* and *Collaboration* represents more of that of *Teacher Professional Learning* but less of that of *Principal Leadership*, meaning *Trust* and *Collaboration* are more closely related to *Teacher Professional Learning*.

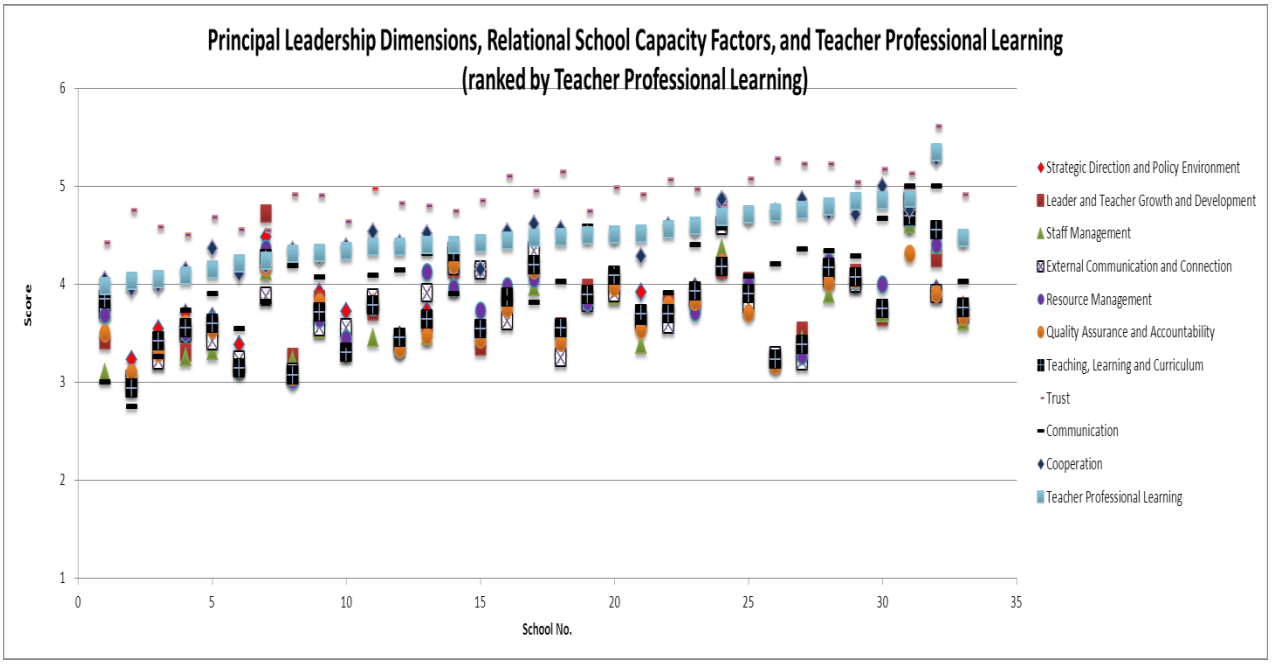

Figure 11 The Mean Scores of the Seven Dimensions of Principal Leadership, Trust, Communication, Collaboration, and Teacher Professional Learning (Ranked by Teacher Professional Learning)

When operationalized into seven dimensions, the relationships between the individual dimensions of *Principal Leadership* and *Teacher Professional Learning* differ (see Figure 11). Considering the low correlations, *Staff Management* might be the most powerful predictor of *Teacher Professional Learning*, followed by *Resource Management*, and *Instructional Leadership*. However, the associations, to different

extent, can hardly be identified from the scatter plot (Figure 11). One reason might be the overlapping of the dimensions. Another reason might be the interaction between the dimensions when considered together.

To sum up, the graphic patterns suggest that, *Principal Leadership*, as a composite and as a set of core practices, are not necessarily significant predictors of *Teacher Professional Learning*. Influence of them on *Teacher Professional Learning* might be better exerted through mediating power of school-level factors.

4.4 Mediation analysis

In social sciences studies, intervening variables are often found "located causally" between independent variables and dependent variables, and account for the "cause-effect relation" (Hayes & Preacher, 2010, p. 627). These intervening variables are usually referred to as mediators if they significantly affect the impact of the independent variables on the dependent variables. According to Preachers and Hayes (2008), mediation outlines the indirect path through which predicative variables achieve impact on proposed outcomes.

The construct diagram in Figure 12 shows causal linkages within a three-variable system and illustrates a mediation design: The predictor (*X)* affects the outcome *(Y)* indirectly through the mediator (*M).* Meanwhile the predictor also has a direct effect on the outcome. The diagram also visualizes the fundamental directional assumptions of mediation modeling that, the predictor variable causes the mediator, and the mediator in turn causes the outcome variable.

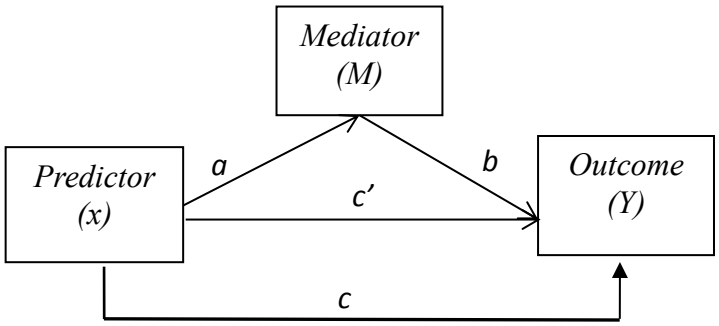

Figure 12 Construct Diagram Showing Causal Linkages within a Three-variable System of a Simple Mediation Design

Mediation analysis encourages "functional understanding of the relationships among variables" (Preacher & Hayes, 2004, p. 717). Baron and Kenny (1986) propose a four-step process for the testing of mediation effect, as described below and illustrated in Figure 12. Despite the controversies, the four step criteria are still the orthodox in mediation analysis.[10] The steps are as follows.

(1) In Step 1, the effect of the predictor on the outcome variable is assessed (path c). If significant, move to Step 2.

(2) The effect of predictor on the mediator is assessed (path a). If significant, move to Step 3.

(3) The effect of the mediator on the outcome variable is assessed (path b). If

[10] There has been heated discussion over Baron and Kenny's (1986) causal steps for mediation analysis throughout the years. For example it is claimed that, the relation between the predictor and mediator does not provide evidence of mediation. However, causal steps method is found to "have adequate power when sample sizes were large or when the mediated effects were large" (Kenny, Kashy, & Bolger, 1998, p. 235; Fritz & MacKinnon, 2007).

significant, move to Step 4.

(4) The effect of the predictor on the outcome variable, with the mediator controlled for, is assessed (path c').

If still significant, but the effect coefficient reduces nontrivially, partial mediation is indicated; if the effect coefficient reduces to 0, full mediation is indicated.

Apart from the stepwise criteria, "a necessary component of mediation is a statistically and practically significant indirect effect" (Preacher & Hayers, 2004, p. 717). However, Baron and Kenny's (1986) four-step mediation chain only enables researchers to determine the first two criteria, presence and strength of effects. The method does not, however, test the significance of the effects. Thus, assessment of the significance of indirect effects should be included as part of simple mediation analyses. It is especially true considering that the Baron and Kenny's regression procedures are prone to erroneous conclusion.

SPSS macros provided by Hayes and Preacher (2012) are used for testing significance of mediated effects. [11] Given the deficiency of the much blamed Sobel (1982) test, this study adopts the bootstrapping method to test the significance of the indirect effect, which is integrated into the macros.[12] If the indirect effect of *Principal*

[11] Technically, mediation analysis can be conducted more rigorously through the use of structural equation modelling programmes, such as Lisrel, Mplus, and Amos, which take the measurement errors into account and estimate all the relationships simultaneously. However, regressions are still often used to detect mediator effects, considering that it is an "accessible data-analytic technique contained in major statistical packages" (Frazier, Tix, & Barron, 2004, p. 115). Additionally, given the complexity of structural equation modelling (SEM) techniques, regressions are reasonable alternative procedures though less robust. Moreover, regressions do not require large sample sizes as structural equation modeling does. Last but not least, "statistical techniques are only tools, and no matter how sophisticated they are"; it is the substantive interpretation of the data and findings that makes the point (Pang, 2010, p. 363).

[12] In simple mediation, the Sobel test used to be regarded as the best regarding its intuitive appeal, which compares the strength of the indirect effect on the outcome variable to the null hypothesis that the indirect effect is 0 when the mediator is controlled for (Preacher & Hayers, 2004). However, in recent years the low power of Sobel test is questioned, and its assumption of multivariate normality of the standard error of the indirect effect is proved impossible and routinely violated (Preacher & Hayers, 2004; 2010). As claimed, the Sobel test in fact used a parametric method to estimate the nonparametrically distributed statistics.

Leadership on *Teacher Profession Learning* through a school capacity factor is significant, the mediating effect of the factor is supported.

"The validity of one's conclusions about mediation is determined by the design of the study as much as by statistical criteria" (Preacher & Hayes, 2004, p. 718). Conceptually the casual system is based on preexisting theory and research rather than purely exploratory assumptions. Likewise, statistical affirmation of the selected mediators should also be made "a priori in the design stage rather than post hoc" (Frazier, Tix, & Barron, 2004, p. 117).

From statistical point of view, one concern regarding selection of potential mediators is the contrast of the sizes of correlation between the predictor and mediator and that between the mediator and outcome. While comparable in size, the power of the mediational test will be maximized when the correlation between the mediator and outcome is considerably stronger than that between the predictor and mediator (Frazier, Tix, & Barron, 2004, p. 127). Conversely, high correlation between the predictor and the mediator, results in decrease of the power of mediation due to multicolinearity. Another concern is to ensure that the sample size is sufficiently large and effective (Frazier, Tix, & Barron, 2004; Fritz & MacKinnon, 2007). Otherwise, the power of the tests of mediation effects will compromise.[13]

Upon satisfaction of the above criteria, reliability of the measure of the theoretically

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Instead, to obtain confidence intervals the bootstrapping method is much recommended. The bootstrapping method does not follow the assumptions of large sample size. Nor does it follow normal and symmetrical distribution of indirect effects. It uses resampling method to create random samples each time from the original sample and computes the mean of indirect effect from all the replacement samples, hence the higher accuracy for inference.

When the mediation model is estimated through the bootstrapping method, several pairs of indirect effects percentile bootstrap confidence interval estimates can also be generated. The standard error estimate provides inference about the size of an indirect effect. The R-squared and kappa-squared measure are available only in simple mediation models (Preacher & Kelley, 2011).

[13] Kenny et al. provide a formula to estimate the "effective sample size" with the correlation between the predictor and the mediator:

$N (1 - Rxm^2)$

"Where N is the sample size, and Rxm is the correlation between the predictor and the mediator" (Frazier, Tix, & Barron, 2004, p. 127).

based mediator is subjected to further test. Low reliability of the measure results in underestimation of the mediator effects on outcome variable and overestimation of the predictor effects on outcome variable (Judd & Kenny, 1981; Kenny, Kashy, & Bolger, 1998). A measurement reliability of the mediator higher than .90 is recommended by Hoyle and Robinson (2003).

4.4.1 Is *Trust* a mediator between the relationship of *Principal Leadership* and *Teacher Professional Learning*?

The rational of selecting *Trust* as a potential mediator in the relationship between *Principal Leadership* and *Teacher Professional Learning* is theoretically grounded in previous studies. As a capacity-building mechanism supportive *Principal Leadership* practices fosters collegial trust, and trust between teachers fosters their professional learning (see for example, Bryk & Schneider, 2003; Caskey, 2010; Hoy & Miskel, 2008; Tarter et al., 1989; Wahlstrom & Louis, 2008). Upon the theoretical legitimacy of *Trust* as a mediator, statistical issues are considered to ensure the practical possibility.[14]

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[14] The first is about the size of correlation between *Trust* and *Teacher Professional Learning* (.658) relative to that between *Principal Leadership* change and *Trust* (.137). Both significant at the .01 level (2 tailed), the former is substantially higher than the latter. The latter is low, and not likely to result in multicolinearity, thereby ensuring the power of mediation tests.

The second practical issue is the effective sample size, calculation of which is based on the correlation between the predictor and the mediator. Following Kenny et al.'s formula (see footnote No. 9), the sample size in this study is 970, and the bivariate correlation between the predictor *Principal Leadership change* and *Trust* is .137, therefore the effective sample size for this single mediational model is 952. Despite of the low correlation between the predictor and mediator, power reduces to what it will be if the sample size reaches 952. In other word, the sample size effective at testing the power of mediation is 952. Namely, this study has a sample larger than required.

Finally tested is the reliability of the measurement of the mediator *Trust*. In this study, with three items the reliability coefficient of *Trust* is .817, not exceeding the recommended threshold value, .90, but considerably higher than the lower end limit, .70.

To conclude, the proposed mediator has met the practical criteria above mentioned.

The bootstrapping parameter was set to resample randomly 10,000 times. The analyses follow the classical Baron and Kenny's four-step causal regression approach. To counterbalance the deficiencies of the causal steps, the bootstrapping procedure is also used to assess whether the indirect effect of *Principal Leadership* on *Teacher Professional Learning* through *Trust* is significant. It further reports effect sizes and ratios of the direct and indirect effects, which might be of practical implications.

Table 8

Regression Results of Impact of Principal Leadership on Teacher Profession Learning through Effects of Trust

Step	Variables	B	SE(B)	t	Sig. (*p*)	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: *Trust*						
	Principal Leadership	.104	.024	4.313	.000	.057	.151
	$R = .137$, $R^2 = .019$, $F(1, 968) = 18.603$, $P < .001$						
Step 3	Dependent Variable: *Teacher Profession Learning*						
	Trust	.674	.025	27.155	.000	.630	.720
	$R = .658$, $R^2 = .432$, $F(1, 968) = 737.396$, $P < .001$						
Step 4	Dependent Variable: *Teacher Profession Learning*						
(Direct Effect)	*Trust*	.648	.024	26.655	.000	.600	.696
	Principal Leadership	.146	.018	7.920	.000	.110	.182
	$R = .683$, $R^2 = .467$, $F(1, 967) = 67.728$, $P < .001$						

Results of the stepwise regression analyses are reported in Table 8. The first step attempts to determine if *Principal Leadership* is a significant predictor of *Teacher Professional Learning*. *Teacher Professional Learning* is regressed on the composite measure of *Principal Leadership*. As displayed in Table 8, *Principal Leadership* demonstrates a significant direct effect on *Teacher Professional Learning* (β = .213, p < .001) and accounts for 7.5% of the total variance of *Teacher Professional Learning*.

The second step aims to understand the relationship between *Principal Leadership* and *Trust*. When *Trust* is regressed on *Principal Leadership*, a small but significant effect (β = .104, p < .001) between the two variables is found. However, *Principal Leadership* is weakly correlated to *Trust* (zero-order correlation = .137) and only explains a relatively small portion (1.9%) of the total variance of *Trust* (also see Table 8).

In the third step, the relationship between *Trust* and *Teacher Professional Learning* is examined. *Teacher Professional Learning* is regressed on *Trust*. A relatively big and significant effect (β = .648, p < .001) is found. *Principal Leadership* is correlated to *Trust* to a higher degree (zero-order correlation = .674) and explains a considerably larger proportion (43.2%) of the total variance of *Teacher Professional Learning* (also see Table 8).

In Step 4, *Teacher Professional Learning* is regressed on *Principal Leadership* and *Trust* to test whether it is still a significant predictor of *Teacher Professional Learning* after controlling for the effect of *Trust*. In this analysis, *Trust* is entered in the first block in the hierarchical regression, and *Principal Leadership* the second. *Principal Leadership* remains a significant predictor of *Teacher Professional Learning*. However, the absolute size of the effect weakens nontrivially but not to 0 (.213 to .146, p < .001), suggesting that *Trust* is a partial mediator between *Principal Leadership* and *Teacher Professional Learning*. With the effect of *Trust* controlled for, *Principal Leadership* explains 46.7% of the total variance of *Teacher Professional Learning*. In this regression analysis majority of the variance explained should be attributed to the stronger relationship between *Trust* and *Teacher Professional Learning* (zero order correlation = .658), *as opposed to* that between *Principal Leadership* and *Trust* (zero order correlation = .275).

Up to this point, the series of regression analysis have met the criteria of Baron and Benny's (1986) causal steps. The substantial decrease of the effect of *Principal Leadership* on *Teacher Professional Learning,* when effect of *Trust* is controlled for, indicates that *Trust* is a partial mediator in the relationship. The direct effect of *Principal Leadership* on *Teacher Professional Learning* (.146) accounts for a larger proportion of the total effect .213 (as shown in Figure 13). Its indirect effect (.067) on *Teacher Professional Learning* is the product of the effect of *Principal Leadership* on *Trust* (.104) and the effect of *Trust* on *Teacher Professional Learning* (.648) (as shown in Figure 14).[15]

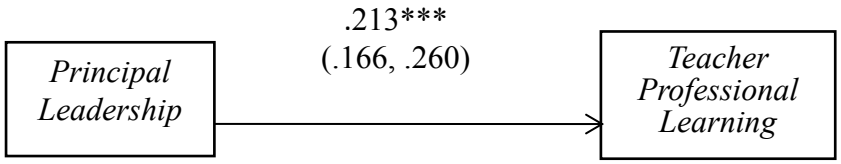

Figure 13 The Total Effect Model of the Impact of Principal Leadership on Teacher Professional Learning

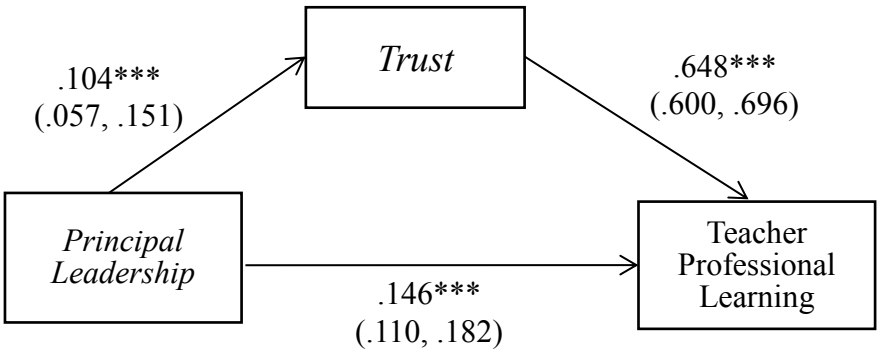

Figure 14 The Single Mediation Model Estimating Effects of Principal Leadership on Teacher Professional Learning through Trust

This pattern of results suggests that *Trust* is very likely a partial mediator of the relationship between *Principal Leadership* and *Teacher Professional Learning*.

[15] It should be noted that, the relatively small amount of indirect effect does not contradict the large variance *Trust*, or *Principal Leadership* and *Trust* jointly, explains towards *Teacher Professional Learning*. The small but significant indirect effect of *Principal Leadership* on *Teacher Professional Learning* can be statistically attributed to the low correlation between *Principal Leadership* and *Trust*.

However, as indicated earlier, sole reliance on regression leaves the significance of the mediating effect open to question. Therefore, additional test of statistical significance of the mediated relationship via the bootstrapping method is employed. In this analysis, if the indirect effect of *Principal Leadership* on *Teacher Profession Learning* through *Trust* is significant, the mediating effect of *Trust* is supported.

By the bootstrapping method, the mean score of the indirect effect estimate calculated through the 10000 times random sampling is .067, yet reaching the medium level.[16] Based on different algorithm methods, three pairs of 95% confidence intervals of the indirect effect for population value are generated.[17] For each pair, 0 is not included in the confidence intervals. That is, the indirect effect is significantly different from 0 at .05 level (two tailed). The conclusion is that, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* through *Trust* is significant. [18] In other words, *Trust* is a mediator between the relationship of *Principal Leadership* and *Teacher Professional Learning.*

Appendix D also shows the proportion of the indirect effect in contrast with the total effect and direct effect of *Trust*, and the statistical significance of the mediation and proportions. The indirect effect of *Principal Leadership* on *Teacher Professional Learning* constitutes a significant 31.61% of its total effects on *Teacher Professional Learning*. In other words, approximately 31.61% of the total effect of *Principal Leadership* on *Teacher Professional Learning* is mediated by *Trust*.

Further, the indirect effect is significantly about 46.21% of the direct effect of

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[16] Designation of effect sizes as small, medium, or large is fundamentally arbitrary and depends on the particular application. Conventionally used is the usual Cohen (1988) standards of .1 for small, .3 for medium, and .5 for large (also see Shrout & Bolger, 2002). Since an indirect effect is a product of two effects, the indirect effect values should be squared (Kenny, 2014). Therefore, a small effect size would be .01, medium would .09, and large would be .25.

[17] As observed, the upper and lower ends of the confidence intervals do not have the same distance from the point of estimate, hence the slight asymmetry in the confidence interval. This again proves the wrong assumption of normal distribution of the indirect statistics.

[18] In the bootstrapping output, if 0 is not included in the pairs of confidence intervals, the estimate is statistically significant, vice versa. This criteria will be followed where the bootstrap confidence intervals are reported.

Principal Leadership on *Teacher Professional Learning*. The R-squared mediation effect size and Preacher and Kelley's (2011) Kappa-squared,[19] both reported only for simple mediation analysis, again evidence that the mediated effect is small in size but statistically significant. In addition to the significant t-ratio of the statistics, the pairs of confidence intervals that do not include 0 also verify the significance of the effect sizes. In brief, findings from the bootstrapping significance test are consistent with the regression results.

This mediation analysis is extended to test whether *Trust* has mediating power between the seven core areas of *Principal Leadership* practices and *Teacher Professional Learning.* As shown in Figure 15, when *Principal Leadership* is conceptualized as seven core areas of leadership practices, the direct and indirect effects of the seven dimensions on *Teacher Professional Learning* vary. Further detailed in Appendix E, principals' *Strategic Direction* and *Staff Management* have significant indirect effects via *Trust* on *Teacher Professional Learning*, respectively. The mediating effects of *Trust* between *Principal Leadership* on *Teacher Development* and *Instructional Leadership* are not significant. This is also true with the other three leadership dimensions, e.g., *External Communication, Resource Management,* and *Quality Assurance*. In contrast, *Teacher Development* and *Instructional Leadership* are found to have significant direct effects and total effects on *Teacher Professional Learning*.

[19] . Kappa-squared indicates the proportion of the maximum possible indirect effect of a predictor variable on an outcome variable. Preacher and Kelley (2011) use the notation kappa-squared to denote that like the squared multiple correlation coefficient, it (a) cannot be negative, (b) is bounded (inclusively) between 0 and 1, and (c) represents the proportion of the value of a quantity to the maximum value it could have been. Otherwise, and the population squared multiple correlation coefficient have generally different properties.

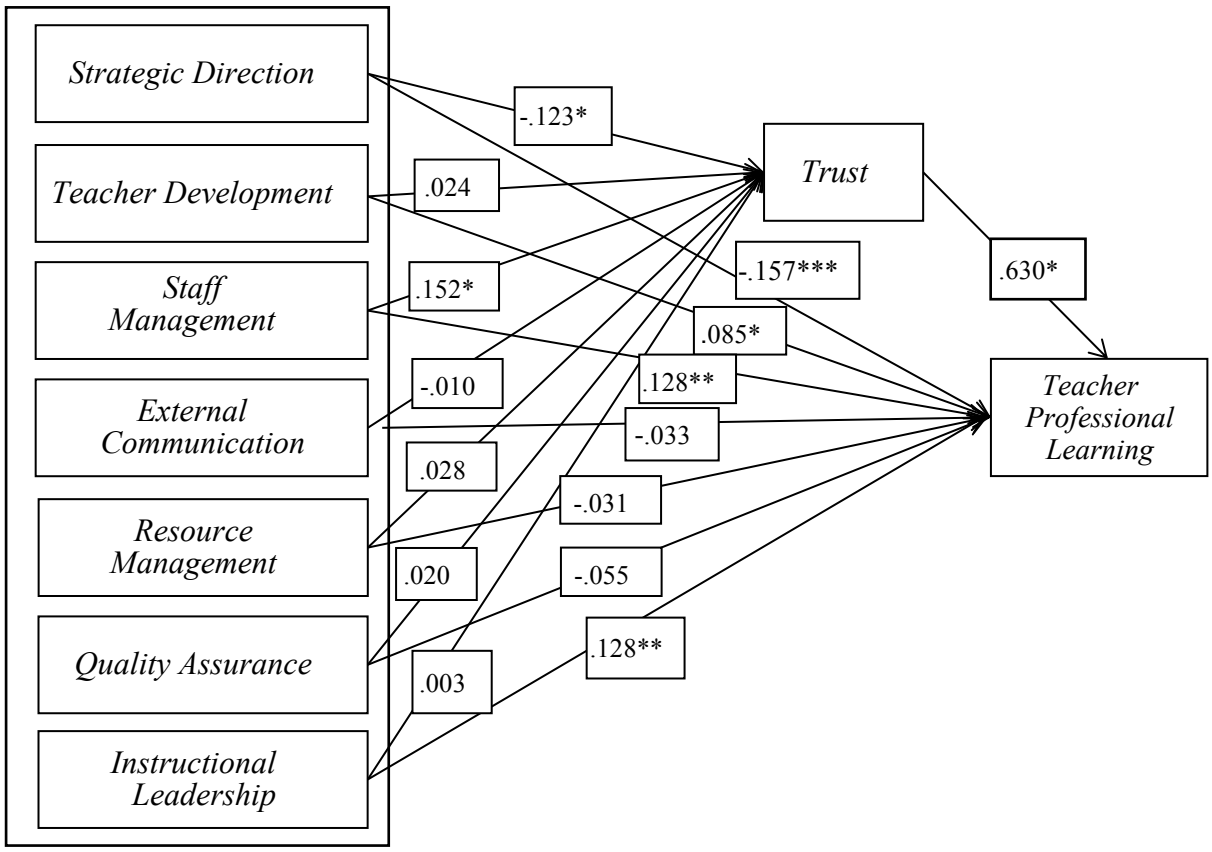

Figure 15 Indirect Effects of the Seven Core Areas of Principal Leadership Practices on Teacher Professional Learning through Trust

In summary, the four causal steps have affirmed the causal linkages in the mediation system. The relationships all hold in the conceptualized direction. Multiple evidence from the significance test of indirect effects further proves that, *Trust* has a significant partial mediating effect on the relationship between *Principal Leadership* and *Teacher Professional Learning*. The extended mediation analysis, with the seven core areas of *Principal Leadership* practices used as multiple predictors, identifies how different the direct effects, and indirect effects of *Principal Leadership* through *Trust*, on Teacher Professional Learning are. The practical implication is that, when leading schools principals can facilitate *Teacher Professional Learning* through providing support to establish trust at school. Principals should also adjust their strategic direction and emphasize teacher development. Equally important, instructional leadership on teaching, learning, and curriculum should also be valued, and supported

by the principals directly.

Considering the very possible multiple causes of social phenomena, there might be multiple mediating factors operating in the same time. The practical suggestion is to seek mediators that significantly reduce the indirect effect (Baren & Kenny, 1986). Therefore, the study proceeds to identify potential mediating effects of other school capacity factors on the relationship between *Principal Leadership* and *Teacher Professional Learning*.

4.4.2 Is *Communication* a mediator between *Principal Leadership* and *Teacher Professional Learning*?

Upon the theoretical legitimacy of *Communication* as a potential mediator between *Principal Leadership* and *Teacher Professional Learning* (e.g., Danielson, 2006; Tschannen-Moran, 2000), statistical possibility are also checked, and criterion met.[20]

The analyses follow Baron and Kenny's (1986) causal steps criterion. Results of the stepwise regressions are demonstrated in Table 9.

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[20] The first issue is about the size of the correlationship between *Communication* and *Teacher Professional Learning* (.684) relative to that between *Principal Leadership* and *Communication* (.298). Both are significant at the .01 level (2 tailed), the former is substantially higher than the latter. The latter is low and less likely to lead to multicolinearity and to decrease the power of mediation tests.

The second issue is about the effective sample size. The bivariate correlation between the predictor *Principal Leadership* and *Communication* is .298, therefore for effective testing of the power of mediation, a sample of 884 is requested. The current sample size (N = 970) suffices.

Given that the proposed mediator has met the theoretical and statistical criteria above mentioned, further tested is the reliability of the measurement of the mediator *Communication*. The reliability coefficient of *Communication* is .863, not exceeding the threshold value, .90, but considerably higher than the lower end limit, .70.

Table 9

Regression Results of Impact of Principal Leadership on Teacher Profession Learning through Effects of Communication

Step	Variable	B	SE(B)	t	Sig. (*P*)	LLCI	ULCI
Step 1	Dependent Variable: *Teacher Profession Learning* (Path c)						
(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: *Communication* (Path a)						
	Principal Leadership	.296	.033	9.006	.000	.233	.361
	$R = .2781$, $R^2 = .0773$, $F(1, 968) = 81.1086$, $P < .001$						
Step 3	Dependent Variable: *Teacher Profession Learning* (Path b)						
	Communication	.478	.018	25.103	.000	.410	.540
	$R = .657$, $R^2 = .431$, $F(1, 968) = 733.234$, $P < .001$						
Step 4	Dependent Variable: *Teacher Profession Learning* (Path c')						
(Direct Effect)	*Communication*	.457	.018	25.103	.000	.422	.493
	Principal Leadership	.077	.019	3.978	.000	.039	.115
	$R = .6634$, $R^2 = .4402$, $F(2, 967) = 380.1433$, $P < .001$						

Given that *Principal Leadership* has been evidenced as a significant predictor of *Teacher Professional Learning* in Step 1 of the previous section, the first analysis in this section seeks to understand the relationship between *Principal Leadership* and *Communication. When Communication* is regressed on *Principal Leadership*, a significant ($\beta = .296$, $p < .001$) between the two variables is found. *Principal Leadership* is weakly correlated to *Communication* (zero-order correlation = .278) and explains 7.73% of the total variance of *Communication* (also see Table 9).

Next the relationship between *Communication* and *Teacher Professional Learning* is

examined. *Teacher Professional Learning* is regressed on *Communication*. A relatively big and significant effect (β = .457, p < .001) of *Communication* on *Teacher Professional Learning* is found. *Communication also* explains a considerably larger proportion (46.7%) of the total variance of *Teacher Professional Learning* (see Table 9).

Finally *Teacher Professional Learning* is regressed on *Principal Leadership* and *Communication,* to test whether *Principal Leadership* is still a significant predictor of *Teacher Professional Learning* when *Communication* is controlled for. In this analysis, *Communication* is entered in the first block of the hierarchical regression, and *Principal Leadership* the second. As shown in Table 9, *Principal Leadership* is still a significant predictor. The absolute size of the effect reduces substantially from .213 to .077 (p < .001). The decrease is nontrivial but not to 0, suggesting that *Communication* is a partial mediator between *Principal Leadership* and *Teacher Professional Learning.* With the effect of *Communication* controlled for, *Principal Leadership* explains 44.02% of the total variance of *Teacher Professional Learning*. In this regression analysis majority of the variance explained should be attributed to the stronger relationship between *Communication* and *Teacher Professional Learning* (zero order correlation = .684)*,* as opposed to that between *Principal Leadership* and *Communication* (zero order correlation = .275). Therefore, C*ommunication* is very likely a partial mediator of the relationship between *Principal Leadership* and *Teacher Professional Learning*. The significant decrease of the effect of *Principal Leadership* on *Teacher Professional Learning,* when effect of *Communication* is controlled for, together with the largely reduced portion of variance explained, indicates that *Communication* is a partial mediator in the relationship.

The series of regression models have met the criteria of Baron and Benny's (1986) causal steps. The indirect effect of *Principal Leadership* on *Teacher Professional Learning* (.136) is the product of the effect of *Principal Leadership* on *Communication* (.296) and effect of *Communication* on *Teacher Professional Learning* (.457) (as shown in Figure 16). The direct effect of *Principal Leadership* on *Teacher Professional Learning* (.077) still contributes to a larger proportion of the total effect, .213.

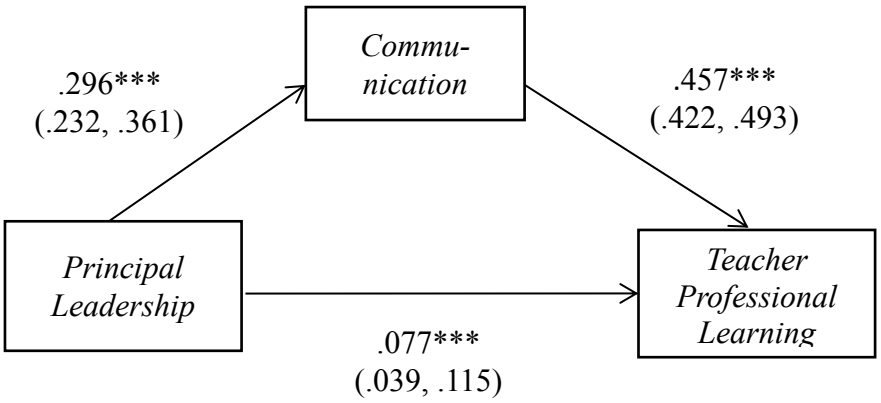

Figure 16 The Single Mediation Model Estimating Effects of Principal Leadership on Teacher Professional Learning through Communication

Given the proved presence and strength of the mediated effect, next the significance of the indirect effect is tested via the bootstrapping method. In this analysis, if the indirect effect of *Principal Leadership* on *Teacher Profession Learning* through *Communication* is significant, the mediating effect of Communication is supported. As shown in Appendix F, the mean score of the indirect effect estimate calculated through the 10000 times random sampling is a medium sized .136, significantly different from 0 at .05 level (two tailed).

Appendix F also shows the proportion of the indirect effect in contrast with the total effect and direct effect. The indirect effect of *Principal Leadership* on *Teacher Professional Learning* constitutes a significant 71.67% of its total effect. Further, the indirect effect is significantly about 2.5 times of the direct effect of *Principal Leadership* on *Teacher Professional Learning*. The R-squared mediation effect size and Preacher and Kelley (2011) Kappa-squared again evidence that the mediated effect of *Communication* is significant statistically.

This mediation analysis is extended to test whether *Communication* mediates between the seven core areas of *Principal Leadership* practices and *Teacher Professional Learning*. When the seven core areas of *Principal Leadership* practices are used as

multiple independent variables, the direct and indirect effects of the areas on *Teacher Professional Learning* through *Communication* vary, as demonstrated in Figure 17.

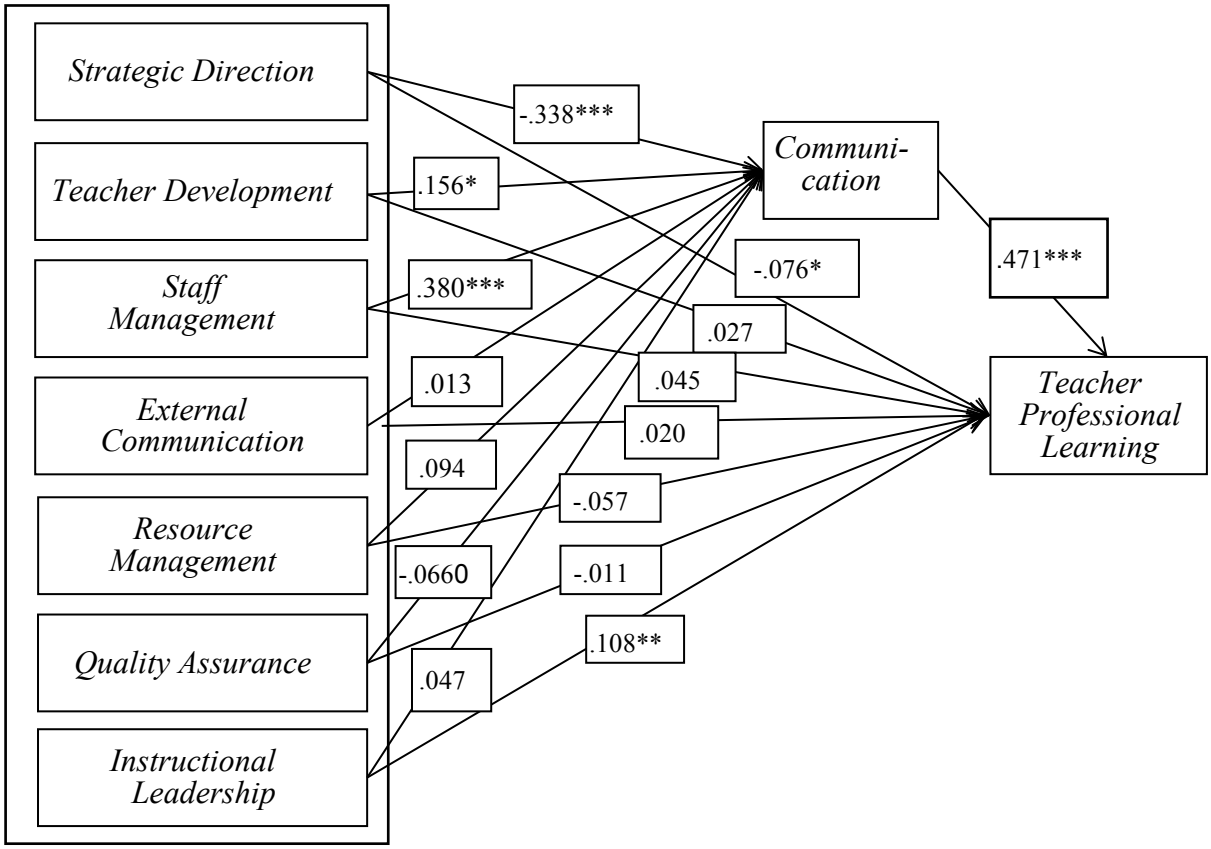

Figure 17 Indirect Effects of the Seven Core Areas of Principal Leadership Practices on Teacher Professional Learning through Communication

Further detailed in Appendix G, principals' *Strategic Direction* and *Staff Management* have significant indirect effects via *Communication* and significant total effects on *Teacher Professional Learning*, respectively. The mediating effects of *Communication* on *Principal Leadership,* in terms of *Teacher Development* and *Instructional Leadership,* are not significant. However, the total effects of them are significant. The dimensions *Strategic Direction* and *Instructional Leadership* are the only two that have significant direct effects.

At large, the four causal steps have verified presence and strengths of the mediated *Principal Leadership* effects on *Teacher Professional Learning* via *Communication*. The relationships all hold in the conceptualized direction. Multiple evidence from the test of significance of the indirect effects further proves that, *Communication* has a significant partial mediating effect on the relationship between *Principal Leadership* and *Teacher Professional Learning*. The extended mediation analysis also shows that, *Communication* mediates the relationship between some of the seven core areas of *Principal Leadership* (*i*.e., *Strategic Direction* and *Staff Management*) and *Teacher Professional Learning.*

4.4.3 Is *Collaboration* a mediator between the relationship of *Principal Leadership* and *Teacher Professional Learning*?

The likelihood of *Collaboration* as a mediator in the relationship of *Principal Leadership* and *Teacher Professional Learning* is theoretically grounded (see for example, Quicke, 2000; Scribner et al., 2007; Leonard, 2010). Statistical legitimacy is tested and proved.[21] Results of the stepwise regressions are shown in Table 10.

[21] First, the size of correlation between *Collaboration* and *Teacher Professional Learning* (.761) is substantially higher than that between *Principal Leadership change* and *Collaboration* (.273), both significant at the .01 level (2 tailed). The latter is low, and not likely to result in multicolinearity, thus decreasing the power of mediation tests.

Secondly, effective sample size for this single mediational model is 898. The current sample size (N = 970) suffices.

Finally, further tested is the reliability of the measure of the mediator *Collaboration*. With all five items the reliability coefficient of *Collaboration* is .932, exceeding the threshold value, .90.

Table 10

Regression Results of impact of Principal Leadership on Teacher Profession Learning through Effects of Collaboration

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
	$R = .764$, $R^2 = .583$, $F(2, 967) = 676.875$, $P < .001$						

Given that *Principal Leadership* has been proved a significant predictor of *Teacher Professional Learning* in previous simple mediation analysis, *Collaboration* is regressed on *Principal Leadership* to detect how they are related. As shown in Table 10, *Principal Leadership* is found a significant predictor of *Collaboration* ($\beta = .222$, $p < .001$), contributing to a low of 7.4% of the total variance. Therefore, *Principal Leadership* is significantly predictive of *Collaboration*.

Next, *Teacher Professional Learning* is regressed on *Collaboration* to detect how they are related. As shown in Table 10, *Collaboration* is a significant predictor of *Teacher Professional Learning*, explaining a high of 57.8% of the total variance

with a big effect (β = .708, p < .001).

In the final step, *Teacher Professional Learning* is regressed on *Principal Leadership* and *Collaboration* to test whether *Principal Leadership* is still a significant predictor of *Teacher Professional Learning*, when effect of *Collaboration* is controlled for. *Collaboration* is entered in the first block in the hierarchical regression, and *Principal Leadership* the second. As shown in Table 9, *Principal Leadership* remains a significant predictor of *Teacher Professional Learning*, the absolute size of the regression weight drops dramatically from .213 to .056.

The significant decrease of the effect of *Principal Leadership* on *Teacher Professional Learning,* when effect of *Collaboration* is controlled for, indicates that *Collaboration* is likely a partial mediator in the relationship. The indirect effect of *Principal Leadership* (.156) on *Teacher Professional Learning* is the product of the effect of *Principal Leadership* on *Collaboration* (.222) and effect of *Collaboration* on *Teacher Professional Learning* (.708) (as shown in Figure 18).

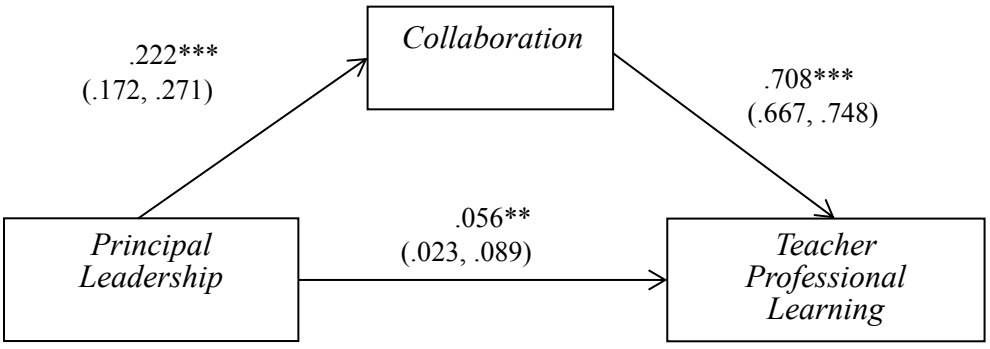

Figure 18 The Single Mediation Model Estimating Effects of Principal Leadership on Teacher Professional Learning through Collaboration

Next, the indirect effect of *Principal Leadership* on *Teacher Profession Learning* through *Collaboration* is tested via the bootstrapping method. The mean score of the

indirect effect estimate calculated through the 10000 times random sampling is a medium-sized .156. The mediated effect is significantly different from 0 at .05 level (two tailed). The conclusion is that, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* through *Collaboration* is significant.

Appendix H shows that, approximately 73.63% of the total effect of *Principal Leadership* on *Teacher Professional Learning* is mediated by *Collaboration*. Further, the indirect effect is significantly about 2.8 times of the direct effect. The R-squared mediation effect size and Preacher and Kelley (2011) Kappa-squared again prove that the mediated effect of *Collaboration* is statistically significant.

The mediation analysis is extended to test whether *Collaboration* has mediating effects between the seven core areas of *Principal Leadership* practices and *Teacher Professional Learning*. Figure 19 shows that, when the seven core areas of *Principal Leadership* practices are used as multiple predictors, the direct and indirect effects of them on *Teacher Professional Learning* through *Collaboration* vary.

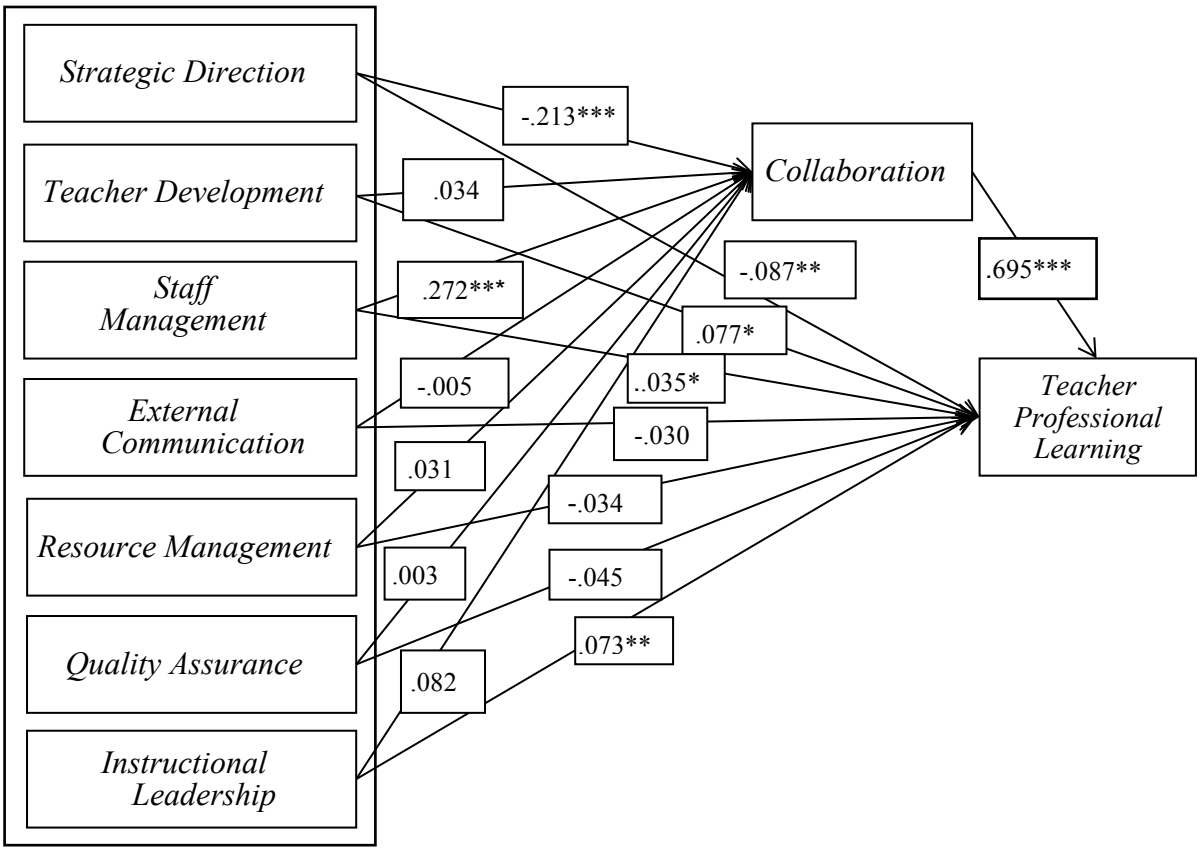

Figure 19 Indirect Effects of the Seven Core Areas of Principal Leadership Practices on Teacher Professional Learning through Collaboration

As shown in Appendix I, only principals' *Strategic Direction* and *Staff Management* in schools have significant indirect effects via *Collaboration*, and total effects, on *Teacher Professional Learning*. Without significant indirect effect, the dimensions *Teacher Development* and *Instructional Leadership* show significant direct and total effects on *Teacher Professional Learning*. The rest three dimensions have neither significant direct, indirect, or total effects.

In brief, the four causal steps test the mediational relationship between *Principal Leadership* and *Teacher Professional Learning*. The relationships all hold in the conceptualized direction. Multiple evidence from the significance test further proves that, *Collaboration* has a significant partial mediating effect on the relationship between *Principal Leadership* and *Teacher Professional Learning*. The extended

mediation analysis identifies how different the direct and indirect effects of *Principal Leadership* dimensions on *Teacher Professional Learning* through the mediating function of *Collaboration* are. The indication is that, while leading school, principals can facilitate *Teacher Professional Learning* through establishing collaboration school wide. Meanwhile they should adjust their strategic direction and emphasize staff management. Last but not least, teacher development and instructional leadership on teaching, learning, and curriculum should also be valued.

The direct effect of *Principal Leadership* on *Teacher Professional Learning* is not zero in all three simple mediation models. Therefore, the three mediators, perhaps together with some other unidentified mediators, operate in the same time (Baren & Kenny, 1986). Considering the very possible multiple causes of social phenomena, next the three school capacity factors are used together to construct a multiple mediator model. The purpose is to observe the extent to which the joint mediating power can reach, and how the mediating power of the mediators when functioning together.

4.4.4 Do *Trust*, *Communication*, and *Collaboration,* when jointly considered, have mediating effects between the relationship of *Principal Leadership* and *Teacher Professional Learning*?

Upon the theoretical legitimacy and statistical evidence of *Trust*, *Communication*, and *Collaboration* as mediators, on their own, between the relationship of *Principal Leadership* and *Teacher Professional Learning*, the possibility of them as parallel multiple mediators are tested. The series of linear regressions, which are for simple mediation analysis, are not conducted. Instead the bootstrapping approach via Hayes' macro for multiple mediators is used. These parallel mediators are affected by *Principal Leadership* and affect *Teacher Professional Learning* in turn.

As calculated from paths in Figure 20, the mean score of the indirect effect estimates

of *Principle Leadership* on *Teacher Professional Learning* though *Trust* is .030, almost half of the size when it is used as the single mediator (.067). The mean scores of the indirect effect through the other two mediators (.067 for *Communication* and .084 for *Collaboration*) are also half the size as when used as single mediators. Together the indirect effects amount to .180 in total. Including the direct effects (.033), the total effects reach .213, the same to the amount of total effects when only one estimator is estimated. This indicates that, the total effects of *Principal Leadership* on *Teacher Professional Learning* remain the same no matter which and how many mediator(s) function in between.

Further comparisons between the first three simple mediator analyses and the multiple mediator analysis show that, the relationship between the predictor *Principal Leadership* and individual mediators does not change. What change are the relations between the mediators and the outcome variable *Teacher Professional Learning* when the three mediators are estimated in parallel. Although their effects are controlled not to transmit to the others, effects of the mediators reduce more than half, so is the direct effects of *Principal Leadership* on *Teacher Professional Learning*. Small but not yet reduced to 0, the significant direct effect estimate suggests that there might still be other mediators between *Principal Leadership* and *Teacher Professional Learning* beyond the school capacity factors included.

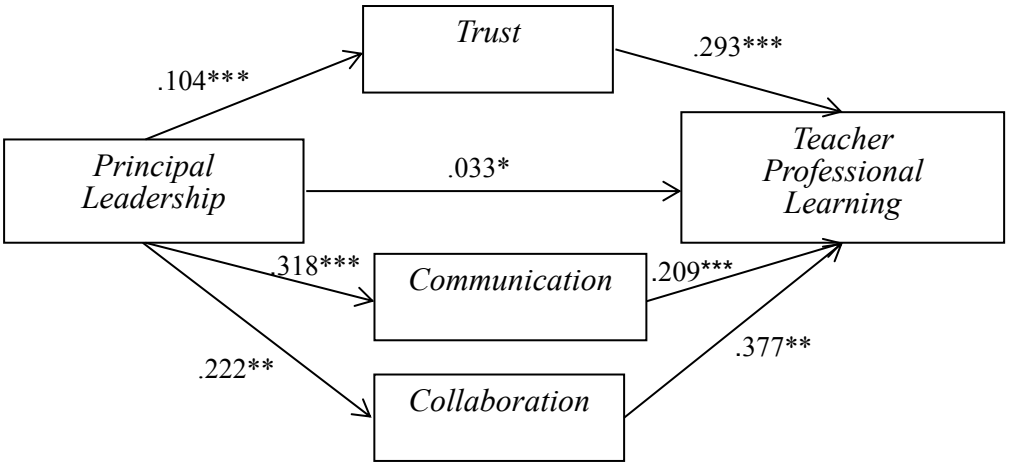

Figure 20 The Multiple Mediation Model Estimating Effects of Principal Leadership on Teacher Professional Learning through Trust, Communication, and Collaboration

As a set, the three school capacity factors are all significant mediators (see Appendix J). The pairwise contrasts of the indirect effects reveal that the specific indirect effect through *Trust* is smaller than that through *Communication*, and specific indirect effect through *Communication* is smaller than that through *Collaboration*. Considering the size of mediation effects the difference between *Trust* and *Communication*, and that between *Trust* and *Collaboration*, are more likely to be significant. Conversely, the difference between *Communication* and *Collaboration* tends to be non-significant.

The lower half of Appendix J also shows the proportions of the indirect effects in contrast with the direct and total effects, and the statistical significance of the estimates. Medium in size, the indirect effects of *Principal Leadership* on *Teacher Professional Learning* through the three mediators are about 84.75% of the total effects of in size. Separately, around 14.28% of the total effect of *Principal Leadership* on *Teacher Professional Learning* is mediated by *Trust. Communication* contributes 31.23% to the total effects, and *Collaboration* contributes 39.24%. The portion of indirect effects through *Trust* is much smaller than those through *Communication* and *Collaboration*, while the latter two are more close to each other. The contrasts of the mediated proportions again evidence the contrasts of sizes of the indirect effects of the mediators.

Further, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* through *Trust* is slightly smaller than the direct effect of it. While the indirect effects of *Principal Leadership* on *Teacher Professional Learning* through *Communication* and *Collaboration* are, respectively, more than double the direct effects of them. In total, the indirect effects through the three mediators are more than five times of the direct effects.

This simple-predictor-multiple-mediator analysis is extended. When the seven core areas of *Principal Leadership* are used as multiple predictors, the direct and indirect effects of them on *Teacher Professional Learning* through the three mediators vary. As

shown in Appendix K, principals' *Strategic Direction* and *Staff Management* in schools have significant but opposite effects via each of the three mediators on *Teacher Professional Learning*. The mediating effects of each mediator on *Teacher Development,* are not significant, nor are the other dimensions. However, the total effects *of Principal Leadership* on *Teacher Development* and *Instructional Leadership* are significant. Principals' *Strategic Direction* and *Staff Management* also show significant total effects. In addition, the dimension *Instructional Leadership* is the only one that has significant direct effects on *Teacher Professional Learning*.

When taken as a set the three mediators all result in significant indirect effects of *Principal Leadership* on *Teacher Professional Learning*, though their mediating power reduces more than half. *Collaboration* contributes the most to the overall mediating effects of the school capacity factors between *Principal Leadership* and *Teacher Professional Learning*, followed by *Communication*. When the seven core areas of *Principal Leadership* are used as multiple predictors, principals' *Strategic Direction* responding to local education context and *Staff Management* in schools show significant indirect effects. The strongest but negative effect of *Strategic Direction* on *Teacher Professional Learning* both directly and indirectly imply that, the more principals emphasize or work in these regard, the less effective *Teacher Professional Learning* will be. Effective staff management of the principals proves to be facilitative to teachers' work at school. When managing staff, teachers' professional autonomy should be a concern (Chrispeels, Andrews, & Gonzalez, 2007; Little, 1990). Teaching professionals are renowned for being over conservative and always resisting changes at work.

The effects of individual mediators on principals' *Teacher Development* are not significant. However, principals' *Teacher Development*, as well as *Instructional Leadership*, has significant direct and total effects on *Teacher Professional Learning*. It might be that, the direct effects of *Teacher Development* and *Instructional Leadership* on *Teacher Professional Learning* are so strong that the indirect effects of it through the mediators diminish. That might be why previous studies (e.g., Desimone, Smith, & Ueno, 2006) maintain that, Principals' *Teacher Development* and *Instructional Leadership* should center on subject knowledge and pedagogies.

In closing, during the process of teacher professional learning, nothing meaningful can happen without authentic trust, communication, and collaboration. Ideally, effective collective work helps 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.

Summary

Chapter Four begins with introducing the response rate and demographic profiles of participating schools and teachers. It then outlines the procedures for data analyses. Mediation analyses and significance tests are conducted. Next descriptive and comparative analyses are conducted to report teachers' perceptions of the status of principal leadership, trust, communication, and collaboration and teacher professional learning in their schools. In line with the procedures of mediation analyses, results are reported and interpreted afterwards.

CHAPTER 5

SUMMARY AND DISCUSSION

Introduction

This chapter begins with a summary of the study's main findings organized by the five research questions. It then proceeds to a discussion and interpretation of the findings, followed by their implications for research, policy, and practice. The chapter concludes with a discussion of the study's limitations and a brief summary.

5.1 Research questions and summary of findings

This study expands the frontiers of the educational leadership research by examining the mediating effects of school capacity on the relationship between principal leadership and teacher professional learning in Hong Kong primary schools. In filling the knowledge gaps in this area, it seeks theoretical and practical evidence to verify the potential mediating effects through a hypothesis-testing approach. This section is organized around the research questions, under which the statistical findings relating to each are summarized.

5.1.1 How are principal leadership, school capacity (i.e., trust, communication, and collaboration), and teacher professional learning related, as perceived by Hong Kong primary school teachers?

Findings: In terms of teachers' perceptions of principal leadership, school capacity, and teacher professional learning, the majority of the ratings were above the means

and midpoints of the measurement scales, suggesting that, on average, the feedback from the teacher respondents was positive. In addition, the skewness and kurtosis values and the response distribution patterns in the histograms suggest the existence of extreme values, but to a relatively low degree. For example, 0.3% of the teachers strongly disagreed that trust had been established in their schools, and 1.13% strongly disagreed that there was communication in their schools.

In brief, most teachers agreed that their principals had demonstrated appreciated leadership attributes and competencies and that their school environments featured trust, communication, and collaboration. They also agreed that teacher professional learning was encouraged and promoted. A small number of respondents either strongly disagreed or strongly agreed with the majority, but they failed to put a dent in the overwhelming majority.

The correlations between the composite means of the dimensions of *Principal Leadership* and *Trust*, *Communication*, and *Collaboration* range from as low as .137 to .298, whereas those across the dimensions of *Principal Leadership* and *School Capacity* are generally low, ranging from .064 to .355. The correlations between *Principal Leadership*, in both the composite and individual dimensions, and *Teacher Professional Learning* are also low (ranging from .146 to .313), suggesting weak relationships. In contrast, the school capacity dimensions are moderately and significantly correlated with *Teacher Professional Learning* (ranging from .658 to .761). By and large, the correlation estimates suggest stronger relationships between *School Capacity* and *Teacher Professional Learning* than between *Principal Leadership* and *Teacher Professional Learning*.

The scatter plots provide more evidence. When aggregated to the school level and ranked from high to low by *Teacher Professional Learning*, perceptions of *Principal Leadership* follows the trend of *Teacher Professional Learning*, but fluctuates tremendously, implying a low degree of correlation with *Teacher Professional Learning*. The ratings and linear trend line of *Collaboration* nearly overlap those of *Teacher Professional Learning*, indicating that they are closely related, which is further evidenced by the high degree of correlation (.761) between them. On the whole, the fluctuations in *Trust*, *Communication*, and *Collaboration* are more similar

to the pattern of *Teacher Professional Learning* than to *Principal Leadership*, meaning that they are more closely related to the former dimension than to the latter.

When considered as seven dimensions, the relationships between the individual *Principal Leadership* dimensions and *Teacher Professional Learning* differ. Also, when ranked by the teachers' ratings of *Teacher Professional Learning*, the fluctuations in the *Principal Leadership* dimensions show no identifiable patterns. Of these dimensions, *Staff Management* appears to be the most strongly related to *Teacher Professional Learning*, followed by *Resource Management* and *Instructional Leadership*, with *Strategic Direction* the least. Conversely, *Trust*, *Communication*, and *Collaboration* still follow the ups and downs of the school-level mean scores of *Teacher Professional Learning*, confirming their strong correlations with it.

In summary, *Principal Leadership*, as both a composite construct and a set of practices, is relatively weakly related to *Teacher Professional Learning*, and *Trust*, *Communication*, and *Collaboration* have stronger relationships with *Teacher Professional Learning* than does such change. These contrasting results suggest that the effects of *Principal Leadership* on *Teacher Professional Learning* may be facilitated through the promotion of *Trust*, *Communication*, and *Collaboration* at the school level.

5.1.2 Is trust a mediator in the relationship between principal leadership and teacher professional learning?

Findings: *Trust* is a mediator in the relationship between *Principal Leadership* and *Teacher Professional Learning*. Mediation analysis showed (1) *Principal Leadership* to be a significant predictor of *Teacher Professional Learning* at the school level; (2) *Principal Leadership* to be a significant predictor of *Trust*; (3) *Trust* to be a significant predictor of *Teacher Professional Learning*; and (4) the effect of *Principal Leadership* on *Teacher Professional Learning* to reduce nontrivially, but not to 0, when *Trust* is controlled for. Last but not least, when *Trust* is controlled for, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* becomes significantly different from 0 at the .05 level. Therefore, *Trust* is a partial mediator of the

relationship between *Principal Leadership* and *Teacher Professional Learning*.

These results suggest that although principals can directly affect teacher professional learning through supportive leadership behavior, the effects of leadership are limited. Teacher professional learning, in contrast, is directly and to a large extent influenced by a trusting workplace environment, and supportive principal leadership is a precondition of the creation of a school climate featuring trust. Taken together, these results suggest that principals can maximize their leadership effects on teacher professional learning by creating a trusting environment within the school.

When *Principal Leadership* is conceptualized as seven core areas of leadership practice, the direct and indirect effects of these areas on *Teacher Professional Learning* via *Trust* vary. Principals' *Strategic Direction* in response to the local education context and *Staff Management* in the school have significant, but opposite, indirect effects via *Trust* on *Teacher Professional Learning*. The mediated effects of *Principal Leadership* in terms of *Teacher Development* and *Instructional Leadership* are not significant, although these two core areas exert significant direct and total effects on *Teacher Professional Learning*. *Trust* has a small but significant (.020) mediating effect on the relationship between the seven core areas of *Principal Leadership* and *Teacher Professional Learning*.

The significant but negative direct and indirect effects of principals' *Strategic Direction* on *Teacher Professional Learning* suggest that the greater the effort principals devote to developing a strategic direction, the less effective teacher professional learning will be. In contrast, adequate *Staff Management* tends to exert a positive influence on teacher professional learning, both directly and indirectly, whereas *Teacher Development* and *Instructional Leadership* have direct, but not indirect, effects on such learning. It is possible that these results can be attributed to the teaching-and-learning-oriented accountability system in Hong Kong schools, which strongly emphasizes teacher effectiveness. Taken together, they suggest that the core areas of principal leadership influence teacher professional learning if the school environment is a trusting one.

5.1.3 Is communication a mediator in the relationship between principal leadership and teacher professional learning?

Findings: *Communication* is a mediator of the effect of *Principal Leadership* on *Teacher Professional Learning*. Mediation analysis showed that (1) *Principal Leadership* is a significant predictor of *Teacher Professional Learning* at the school level; (2) *Principal Leadership* is a significant predictor of *Communication*; (3) *Communication* is a significant predictor of *Teacher Professional Learning*; (4) the effect of *Principal Leadership* on *Teacher Professional Learning* reduces substantially but not to 0, when *Communication* is controlled for; and (5) when *Communication* is controlled for, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* is significantly different from 0 at the .05 level. Therefore, *Communication* is a partial mediator of the relationship between *Principal Leadership* and *Teacher Professional Learning.*

The results suggest that *Teacher Professional Learning* is directly and strongly influenced by effective communication in the workplace. Principals can provide support via adequate leadership effort and create opportunities to promote two-way communication on campus. Further, they can enhance their leadership effects on teacher professional learning by promoting effective communication within the school.

When conceptualized as a set of leadership practices, principal leadership in the areas of *Strategic Direction* and *Staff Management* at the school level has significant and opposite indirect effects via *Communication* on *Teacher Professional Learning*. Although *Instructional Leadership* does not show a significant indirect effect, its direct and total effects are significant. The mediating effects of *Communication* on the other dimensions of *Principal Leadership* are not significant. In sum, *Communication* plays a mediating role between the seven leadership dimensions and *Teacher Professional Learning*. The effect size is close to medium (.071) and significant.

Again, these results suggest that the more effort principals put into developing a

strategic direction, the less effective teacher professional learning will be, even when communication is ensured. Proper staff management appears to positively influence teacher professional learning, both directly and indirectly. Similarly, principals' effort in the area of instructional leadership is sufficiently strong to directly affect teacher professional learning through adequate communication. On the whole, principal leadership effects in the seven core areas of leadership influence teacher professional learning through communication.

5.1.4 Is collaboration a mediator in the relationship between principal leadership and teacher professional learning?

Findings: *Collaboration* is a mediator in the relationship between *Principal Leadership* and *Teacher Professional Learning*. The results of mediation analysis indicate that (1) *Principal Leadership* is a significant predictor of *Teacher Professional Learning*; (2) *Principal Leadership* is a significant predictor of *Collaboration*; (3) *Collaboration* is a significant predictor of *Teacher Professional Learning*; (4) the effect of *Principal Leadership* on *Teacher Professional Learning* reduces dramatically, but not to 0, when *Collaboration* is controlled for; and (5) when *Collaboration* is controlled for, the indirect effect of *Principal Leadership* on *Teacher Professional Learning* becomes significantly different from 0 at the .05 level. Therefore, *Collaboration* is a partial mediator of the relationship between *Principal Leadership* and *Teacher Professional Learning*.

These results suggest that teacher professional learning is directly and strongly influenced by teacher collaboration in the workplace. Principals can build collaborative structures and create opportunities for teachers to work together. On the whole, principals can increase their leadership effects on teacher professional learning by promoting authentic collaboration within the school.

When conceptualized as the seven core areas of leadership, principal leadership in the domains of *Strategic Direction* and *Staff Management* exert significant indirect and opposite effects via *Collaboration* on *Teacher Professional Learning*. Although the

dimensions of *Teacher Development* and *Instructional Leadership* show no significant indirect effect, their direct and total effects are significant. In sum, *Collaboration* has a mediating effect on the relationship between the seven core leadership areas and *Teacher Professional Learning*. That mediating effect (.157) is noticeably larger than that of *Trust* or *Communication*.

Once again, these results show that the more effort principals devote to developing a strategic direction, the less effective teacher professional learning will be, even in a cooperative school environment. Principals' leadership in the area of staff management still has a positive influence on teacher professional learning, both directly and indirectly. Similarly, their efforts in the domains of instructional leadership and teacher professional learning may be sufficiently strong to directly affect such learning through genuine collaboration among teachers. On the whole, principal leadership in the core areas of leadership have significant effects on teacher professional learning through collaboration.

5.1.5 Do trust, communication, and collaboration have mediating effects on the relationship between principal leadership and teacher professional learning when considered jointly?

Findings: When the three school capacity factors are considered together, their effects vary. Pairwise contrasts reveal the mediating effect of *Trust* to be smaller than that of *Communication* and that of *Communication* to be smaller than that of *Collaboration*. Considering the sizes of the mediating effects, the differences between *Trust* and *Communication* and *Trust* and *Collaboration* are more likely to be significant. The total mediated effects between *Principal Leadership* and *Teacher Professional Learning* are significant and range from moderate to large in size (.180), accounting for 84.75% of the total effect of *Principal Leadership* on *Teacher Professional Learning*. In other words, its indirect effect through the three mediators is more than five times stronger than its direct effect.

These results highlight the educative importance of a school environment featuring

trust, communication, and collaboration. Such a school environment effectively transmits the effects of principal leadership to teacher professional learning. Relative to communication and trust, constructive collaboration is the most effective facilitator in this regard. In sum, an overwhelming proportion of the effects of principal leadership can be attributed to trust, communication, and collaboration.

When the seven core areas of *Principal Leadership* are used as multiple predictors, the three school capacity factors are found to be significant mediators between those core areas and *Teacher Professional Learning.* When jointly considered, their indirect effects on *Teacher Professional Learning* differ. The findings suggest that *Trust*, *Communication*, and *Collaboration* together facilitate the effects of *Principal Leadership* on *Teacher Professional Learning*. Principals' *Strategic Direction* and *Staff Management* consistently show significant and opposite effects on *Teacher Professional Learning* via *Trust*, *Communication*, and *Collaboration.* When considered together, the mediated leadership effects on teacher professional learning via trust, communication, and collaboration greatly exceed the direct leadership effects. Most of the facilitating function of leadership can be attributed to collaboration and communication. Consistent with the previous findings, strategic direction is found to hinder teacher professional learning both directly and indirectly, whereas effective staff management strongly promotes it. Finally, principals' emphasis on teacher development and instructional leadership is sufficiently strong to affect teacher professional learning directly.

5.2 Discussion and interpretation

This study conceptualizes and empirically examines the mediating effects of relational school capacity factors on the relationship between principal leadership and teacher professional learning. Its findings validate Li, Hallinger, and Ko's (submitted) suggestion that school leadership effects on teacher professional learning are partially mediated by conditions associated with a school's capacity for change and improvement. They also mirror the internationally agreed idea that school leadership

effects are "indirect in nature and small to moderate in size" (Hallinger, Lee, & Szeto, 2013, p. 268; see also Nir & Hameiri, 2014). Further, this study contributes to the proposition that relational school capacity and a culture of change are key mediators in school improvement (Barth, 1990; Hallinger & Heck, 2011b; Hargreaves & Fullan, 1998; Ko, Hallinger, & Walker, 2012; Sleegers, Geijsel, & Van den Berg, 2002). Additionally, human relation variables are also found to be informative indicators in distinguishing high- and under-performing schools (Rosenholtz, 1985, 1989).

The teachers surveyed for this research generally had positive perceptions of principal leadership, trust, communication, collaboration, and teacher professional learning in their schools. Their recognition and appreciation of principal leadership implies that principals play a key role in teachers' work satisfaction and instructional practice. The results indicate that most principals comply with the guidelines of principal leadership stipulated by the Hong Kong education authorities (ED, 2002b). These guidelines present "a set of expectations regarding the performance of principals" and help principals to "focus their leadership and management on the key goals of school improvement and student learning" (Walker et al., 2000, p. 4). Compliance with them suggests that principals generally demonstrate the key qualities of good principalship.

With regard to the seven core areas of leadership, the participating teachers thought that their principals had changed most in the areas of strategically directing the school and managing staff. However, the results suggest that principals' efforts in these two domains had the strongest effects on teacher professional learning both directly and indirectly, although in opposite directions. Consistent with Ko, Hallinger, and Walker's (2012) findings from a study of Hong Kong secondary schools, the adverse effects of emphasis by principals on strategic development warrant concern. The implication is that the more principals emphasize or work toward a strategic direction, the less effective teacher professional learning will be. Although visionary leadership is considered a core competence of principals, strategic or visionary direction may damage rather than improve schools (Fullan, 1992). Similarly, Bush and Glover (2003) warn that an inadequate strategic direction from principals may damage the attainment of a school vision and/or goals. Therefore, principals should be extremely cautious during the process of strategic direction development and vision-building.

Otherwise, school improvements may not be sustained or even achieved.

Another possible explanation of these findings is that the educational reforms and initiatives formulated by the authorities are often led by principals. Therefore, principals' strategic direction includes implementing external policies and performing quality assurance. At the school level, frontline teachers are eventually held accountable for student achievement. In addition to a heavy teaching workload, these teachers also receive additional work, administrative duties in particular, which can lead to burn-out and even suicide (Cheng, 2009; Cheng & Walker, 2008; Margolis & Nagel, 2006). Although the Hong Kong government is alert to the situation and has established counseling services, the suicide rate is increasing on a yearly basis.

In addition to meeting the demands of accountability, teachers have to allot time to self-development and the attainment of additional qualifications. For example, in Hong Kong, teachers of language courses are required to take the Language Proficiency Assessment for Teachers and assessments in English and Mandarin Chinese, as appropriate. Teachers of Chinese History must also pass an additional assessment of their subject knowledge. The low pass rate of the tests has become a problem, with some teachers having to take them repeatedly, despite an otherwise excellent long-term record, leaving them frustrated and depressed. Although such assessments are not required for teachers of other subjects, many find that taking them or obtaining additional qualifications advantages their career development or at least provides career security. Fierce competition within the profession has rendered baseline assessments more than a benchmark for language-related subject teachers, making them instead an actual in-or-out threshold for a teaching career.

Of the seven core leadership areas, principals' work in the area of staff management has the strongest indirect effects on teacher professional learning. In Hong Kong schools, principals face a huge amount of pressure from both the authorities and teachers. As the change agent in their schools, they must introduce and lead the educational reforms and periodically report to the authorities. When leading reforms, they often have to deal with resistance from teachers. For example, principals may find it difficult to make teachers trust one another and effect real change. One reason for resistance may be teachers' desire to retain the professional autonomy that they

have been privileged to enjoy. However, performance evaluations can be an effective mechanism for principals to achieve a healthy balance in staff management. Rewards for and formal recognition of teachers' work can have positive effects.

The findings of this study also suggest that principals' leadership can affect teacher development, although the indirect effects of their teacher development leadership on teacher professional learning are not always significant or strong. However, in this study, such leadership was found to exert both direct and total effects on teacher professional learning. The same pattern was noted for principals' efforts in the area of instructional leadership.

It is no surprise to find the effects of principal leadership on instructional leadership and teacher development to directly affect teacher professional learning. One possible explanation is that the direct effects in these two areas are so strong that they overlap with the indirect effects through the proposed mediators. This explanation appears to be particularly valid with respect to principals' efforts in the area of instructional leadership, which is directly related to teachers' daily teaching work and progression toward professionalism. It also echoes Hallinger and Lee's (2014) claim that principals' efforts in this area are critical to the enhancement of teaching and learning.

Another possible explanation is that principals are often asked to join the professional development programs that are organized for teachers by the education authorities. In addition, within the school, they are often required to arrange and lead regular professional development activities for teachers. Therefore, principals need to "have both [the] formal authority and expert knowledge to exert influence on teachers" (Bush & Glover, 2003, p. 11). In this sense, principals' teacher development work overlaps with their instructional leadership to some extent.

It has been suggested that professional development programs for teachers should be differentiated according to teacher-learners' competence and ability and subject knowledge where possible (Desimone, Smith, & Ueno, 2006). One-for-all programs are unlikely to achieve remarkable outcomes. Further, there have been calls for a distribution of principal leadership and a change in teachers' role from that of "curriculum user" to that of "curriculum developer" (Law, 2011, p. 393). To make both possible, principals need to share their leadership in the areas of the curriculum

and teaching and learning with teachers and involve them in decision-making about what and how to teach and assess.

The forces that bind people together in schools are multiple and can be strategically arranged, created, and facilitated (Pang, 2010). Of the school capacity factors considered in this study, many schools scored higher for *Trust* than for *Communication* and *Collaboration*. The lower scores for *Communication* may be attributed in part to tight teacher and principal schedules and the professional isolation inherent to teaching careers. Nevertheless, in Hong Kong primary schools, there are regular weekly staff meetings in which the principal and staff meet to exchange information and ideas. Therefore, it is believed that the delivery of information is ensured through formal approaches if not through informal channels, although it should be noted that the quality of communication may be more important than the quantity.

The generally medium to high ratings for *Collaboration* may be a positive consequence of the requirement for an integrated curriculum and team teaching, which has seen teachers on different subject panels work together to design lesson content and execute assessments and evaluations. Within these subject panels, there is also collective lesson preparation and instruction. The purpose of the team-teaching approach is to encourage teachers to open the doors of their classrooms and learn from one another. However, although teamwork has been found effective in promoting individual learning, teams must be delicately structured to realize that outcome (Johnson & Johnson 1989; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981).

In addition to being related to *Teacher Professional Learning* at a medium to high level, *Trust*, *Communication*, and *Collaboration* are also correlated with one another at a lower but still significant level. These findings partly support the conclusions of Baier (1986) and Whitener, Brodt, Korsgaard, and Werner (1998) that interpersonal trust is related to such organizational variables as communication, citizenship behavior, collaboration, problem-solving, performance, and individual risk-taking. The multifaceted nature of trust reveals its complexity as a school-level social resource. For example, although they can build trust with teaching staff and provide

support, principals cannot be expected to be entirely responsible for facilitating collegial trust, which is the foundation of collective teacher professional learning.

This limited responsibility may explain why communication is more effective than trust at facilitating teacher professional learning and why collaboration is the most effective of the three school capacity factors. Communication is an essential aspect of being a good leader (Adams, 2001; Barge, 1994; Gouran et al., 1994), and it is also vital in shaping human relationships. In addition to delivering and collecting information, communication also allows teachers to build intimate collegial relationships and to identify colleagues whom they can trust and with whom they can cooperate. In schools, effective communication leads to greater staff commitment, higher levels of engagement, and greater productivity (Clampitt & Downs, 1993; De Nobile et al., 2013). In addition, communication is a critical ingredient in the success of a school's strategic planning (Negben, 1991).

The cultural context in which communication takes place is also likely to have an effect. In high-context Eastern cultural environments, it is necessary to try to understand people through informal channels (Ryan & Rottmann, 2009). Individuals generally work together more effectively when they know one another personally. In high-context environments, communication takes place more naturally in informal situations such as an end-of-year retreat or Christmas party rather than in such formal situations as regular staff meetings. Principals and teachers are more likely to get to know one another through informal interpersonal interactions, after which real support from either side can be obtained more easily.

Teacher collaboration is vital to both professional pedagogical practice (Quicke, 2000) and educational improvement and development (Connolly & James, 2006; Datnow et al., 2013; Hargreaves, 1994a, 1994b). Collaboration is a "process for exchanges of resources" that occurs when "the important decision-makers believe that joint work can protect and, perhaps even, enhance key organizational resources" (Connolly & James, 2006, p. 77; see also Cook & Friend, 1991, 1995; Ebers, 1997; Tschannen-Moran, 2000). Meaningful collaboration can take place only when people communicate effectively with one another (Datnow et al., 2013; De Nobile et al., 2013).

On the whole, genuine trust, communication, and collaboration are critical to effective school functioning and meaningful teacher professional learning. Exchanges without meaningful information produce nothing and are a waste of time. Ideally, effective collective work helps teachers to arrive at a better understanding of their differences, to work together to shape the environment in which they work, and to meet the targets of professional learning (Ryan & Rottmann, 2009; Young, 2000).

Considering the relatively weak leadership ability of principals in Hong Kong, the development of their relational and emotional competence appears necessary (Cheng, 2000; Wong, 2004). At the same time, principals should also put more effort into providing instructional leadership and supporting teachers' professional learning. In integrating the demands of the internal and external environments and institutionalizing their strategic direction, principals should carefully translate system-level goals into feasible school-level practices (Leithwood, 2001). They are also expected to structure and implement staff and resource management, which rely on effective communication. The visible presence and effective leadership of principals, as resource providers, communicators, and even role models, are preconditions for successful teacher professional learning.

Taken together, the results on the mediated effects of principal leadership on teacher professional learning prove that the most important elements of school leadership are not felt through their direct effects on teachers but rather indirectly through their ability to create a school culture and environment in which teacher learning can thrive (Hallinger & Heck, 1998, 2010; Mulford & Silins, 2003; Printy et al., 2009; Robinson et al., 2008). In this sense, principals play a key role as catalysts for change (Hall & Hord, 2002; Hallinger, 2003; Sleegers et al., 2002; Spillane & Thompson, 1997), as enablers of teacher development (Barth, 1990; Newmann et al., 2000; Robinson et al., 2008), and as leaders of learning.

The dynamics of human relations in the workplace become even more complex during times of change. In Hong Kong, "over competition from marketization" and "close control from accountability measures" have put both principals and frontline teachers under considerable pressure (Cheng, 2009, p. 75; see also Cheng & Walker, 2008). Due to teachers' inclination to view new educational initiatives and reforms

with suspicion, principals have to delicately balance the expectations placed on them from both above and below (Cuban, 1988). Their attempts to implement system initiatives at the school level may engender mistrust if not handled with care. This dilemma is not unique to Hong Kong (Cuban, 1988; Leithwood, 2001; Wildy & Louden, 2000), but there is no doubt that the recent intensification of reforms in Hong Kong has left principals feeling like they are walking a tightrope.

In this stressful environment, leadership of teacher learning relies on the relational and emotional side of a principal's work (Beatty, 2000; DiPaola & Tschannen-Moran, 2003; Donaldson, 2001; Leithwood & Beatty, 2008; McCormick et al., 2006). In practice, principal leadership of teacher learning is often "fraught with discomfort, ambiguity, and uncertainty" (Slater, 2008, p. 331), which brings the discussion back to the conclusive finding that in times of principal leadership plays a key role in creating and sustaining a school environment that features mutual trust, effective communication, and genuine collaboration as a core condition for teacher learning and change.

5.3 Implications and recommendations

The relationship between leadership and learning has engaged the attention of numerous scholars, policymakers, and practitioners over the past half century (Bossert et al., 1982; Bridges, 1967; Gross & Herriot, 1965; Hallinger & Heck, 1998; Leithwood et al., 2008; Robinson et al., 2008). This section discusses the implications of the current study from the perspectives of research, practice, and policy, with recommendations made where appropriate.

Research

This study concentrates on the mediating effects of relational school capacity factors. However, it should be noted that the mediated leadership effects on teacher learning emerge from sources within the school other than principals, including school sponsoring bodies, school management teams, and mid-level leaders such as

vice-principals and heads of department (Gurr & Drysdale, 2013; Ng & Chan, 2014). At the same time, teachers themselves are also influential sources of school leadership (e.g., Ho, 2010; Law, Galton, & Wan, 2007; Shouse & Lin, 2010). The potential for distributed leadership in schools may explain the limited effects of principal leadership on teacher professional learning found in this study. Future studies that take these alternate sources into account may find that the overall effects of school leadership increase significantly. Distinguishing and combining the leadership effects arising from various sources may reveal additional factors that contribute to school capacity and teacher professional learning (Day & Leithwood, 2007; Day et al., 2009).

The findings of this study extend the literature on school leadership by affirming the role of trust, communication, and collaboration as mediators between principal leadership and teacher learning. Methodologically, the study integrated mediation analysis with the bootstrapping method to verify the presence, strength, and significance of the mediated pathways between principal leadership and teacher learning (Hayes & Preacher, 2010). This approach has rarely been employed in the field of educational leadership. It goes further in testing the significance, size, and proportion of confirmed mediating effects, and can be used in studies attempting to identify the mediated pathways of school leadership. However, it is recommended that future studies in this area use a larger array of measures of school capacity to address the problem of omitted variables.

This study further examines how principals' leadership contribute to school improvement more broadly. A fruitful direction for future research would be to investigate the dynamic interaction between school leadership and different dimensions of capacity and their effects on teacher learning. In using the first wave of a set of two-year teacher survey data, this study provides a template for future longitudinal investigations into the changing effects of principal leadership over time. Its findings will be useful for assessing whether the static patterns identified herein hold true over time.

Practice

Principals can enhance teacher professional learning by strengthening school capacity, particularly those elements of school capacity that are related to human relations. This enhanced professional learning will in turn contribute to school capacity-building. The positive interaction between the two is considered "an important prerequisite for addressing the continuous stream of changes" in schools (Thoonen, Sleegers, Oort, Peetsma, & Geijsel, 2011, p. 497), which is certainly true in Hong Kong, where the series of educational reforms in recent decades have created a bottleneck in the process of school transformation (Cheng & Walker, 2008). This study puts forward several possible approaches that schools can pursue to counteract that bottleneck. One approach is to develop the capacity for teacher learning and school improvement.

Hallinger and Taraseina (2000) also suggest several practical ways in which principals can promote teachers' continuous learning. Their interviews with Thai teachers revealed that principals who are successful at leading school change are perceived as sincere, straightforward, and certain. The current study also found these principal features to be preconditions for human capacity-building at the school level. Although these features are to a certain extent inherently personal attributes, they can be developed through learning and practice. For example, even when leading strategic initiatives in a bureaucratic system, principals must still have the capacity to cultivate sincere relationships with teachers. Relationships characterized by sincerity lead to trust. In a trusting relationship, straightforward exchanges are both effective and efficient. Last but not least, in the midst of educational changes, shared values and a shared vision are necessary to keep the principal and teachers together while maintaining a sense of certainty and stability (Barth, 1990).

The workplace environment also has a direct effect 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. Events such as organized tours and end-of-term retreats can provide opportunities for teachers to engage in informal interactions. Above all, principals should communicate effectively and clearly and collaborate with staff rather than merely set directions for them.

To enhance teacher professional learning, the establishment of a teacher learning network is recommended. As Hord (1997) points out, principals' supportive and shared leadership is fundamental to building up a successful school-based network. Principals should also create a school environment that is characterized by trust, effective two-way communication, and a structured collaborative process. Only in a positive and relaxing environment can teachers deprivatize their instructional practices, engage in reflective dialogue, and cooperate with one another. Respect, equality, integrity, and openness between principal and teachers are also important to the construction of a supportive and accepting school environment (Handford & Leithwood, 2013).

Human relationships in the workplace are the building blocks of effective interaction and genuine collaboration. However, developing and maintaining such relationships require time and effort on the part of both principals and teachers. To establish professional working relationships, teachers must give up some autonomy, open up their classrooms, and work collaboratively. However, given the emotional nature of interpersonal collaboration, principals have to be emotionally competent when interacting with teachers for collaborative work to take place. Beatty (2000) notes that leadership aimed at collaboration is generally not "experienced as, or perceived to be, a peaceful, rational process," arguing that although schools provide space for relationships to take place and develop, "within organizations the demands of authentic relationship[s] go largely unfulfilled" (p. 7).

When building the entire school into a site for teacher professional learning, small learning groups in subject panels or cross-disciplinary activities are also important initiatives. Communication and collaboration are the means by which collective work is undertaken, and they give teachers an opportunity to get to know one another and establish trust. It should be noted that this type of collective learning and teaching does not have to constitute "formal structures of planned collaboration" or a "structured process" (Leonard, 2010, p. 237; see also Penuel, Riel, Joshi, Pearlman, Kim, & Frank, 2010). Spontaneous, informal collaboration between teachers can be more effective in terms of leadership provision for change (Scribner et al., 2007; Leonard, 2010).

Policy

Given the educative importance of human relational capacity in schools, the implementers of leadership development programs should design a portfolio of interpersonal skills to help principals and mid-level managers to develop the competencies needed to build school capacity, e.g., the emotional competencies needed to create and maintain professional networks at school (Ng, 2013; Ng & Chan, 2014). As Cheng (2000) and Wong (2004) point out, Hong Kong principals are often capable of educational and structural leadership but not of human relation leadership. The problems that principals may experience during the process of school capacity-building (for instance, inappropriate approaches to communicating with staff) should be pinpointed. Principal recruitment and development procedures should also ensure that principals have the capacity to establish and maintain healthy interpersonal relationships among their staff (Ng & Chan, 2014).

Further, the authorities should encourage principals to suggest tailor-made professional development opportunities to help individual teachers to develop key competencies for more effective teaching. To ensure high-quality development programs that have a clear school-specific "focus on learning" and focus "on the teaching required to promote effective learning," the authorities can help principals to play the role of coach, mentor, and evaluator (Bush & Glover, 2003, p. 33). Given their familiarity with both the school and teachers, principals should be able to provide appropriate feedback to improve or adjust these programs as necessary. Another appropriate approach is to solicit feedback from the targeted teachers via the initiation of principals before the programs are designed. Doing so allows teachers' needs and wishes to be incorporated into the design of the program level and content. Whatever approach is taken, the content of professional development programs for frontline teachers should be linked to subject knowledge and sufficiently flexible to cater for teachers of different competency levels.

In addition to the development of professional competency among teachers, subject panel heads and curriculum leaders should receive purposeful training on how to provide collegial support to teachers and coordinate and manage the collaborative

process. In general, the professional development of teachers of different subjects and levels should be constructive and ongoing, with long-term support provided. Short-term, one-off professional development programs do not lead to meaningful change. In leading teacher development, principals should monitor and evaluate its effects within the particular school context and provide support when necessary. Principals themselves should also receive systematic professional development along with other school leaders (Darling-Hammond, 2005; Goldring, Preston, & Huff, 2010).

Expanding stakeholders' recognition of the importance of school capacity is also critical to policy and practice. Given the bombardment of educational reforms in recent decades and the complexity of educational initiatives at the school level, the authorities need to include school capacity-building as a key element of the teacher development programs they devise and implement rather than promoting it as yet another reform. Above all, the most important aspect of capacity-building at the school level is the creation of opportunities for and conditions conducive to teacher interactions for mutual learning. The authorities would thus be advised to leave the implementation of these goals to individual schools while providing long-term support.

In conclusion, schools are expected to enhance capacity-building by improving teachers' learning and instruction, which is also considered fundamental to addressing the continual stream of educational changes (Thoonen et al., 2011). However, the teaching profession remains dominated by teachers' inherent individualism. Many teachers are reluctant to break down the invisible structures that separate them from one another (Hargreaves, 1992b, 1994, 2007; Harris, 2010). System change is called for to create structural and socio-psychological school features that can support the professional learning considered necessary for school improvement (Glatthorn, 1992; Harris, 2010; Marks & Printy, 2003).

5.4 Limitations

This study had several limitations, although measures were taken to control and compensate for them.

First, the study adopted a quantitative survey design. As a social studies approach, quantitative research uses pre-existing theories to devise models and test proposed theories against data, which allows objective analysis of cross-case patterns through mathematical and statistical methods. Although the quantitative approach is effective in controlling subjectivity, it overlooks differences in individual cases. It is also not conducive to in-depth exploration or elucidation of the lived experiences of the individuals concerned. In contrast, a qualitative approach would have made possible a richer description of the patterns revealed in this study. It would also have provided a richer description of the actual practices used to enact leadership in local primary schools. Therefore, a follow-up qualitative study is recommended to supplement the findings presented herein. A mixed-methods approach is suggested to integrate the strengths of both quantitative and qualitative approaches.

Second, a cross-sectional design is meant to present a snapshot of observed phenomena because data are not collected at different time points. In the case of this study, all of the measures were based on teacher perceptions collected through administration of a one-off online questionnaire survey. However, a longitudinal study "best illuminates factors that inhibit or promote change" (Bryant, 2011, p. 9). A longitudinal design is also more rigorous in outlining the trajectories of change and illustrating dynamic relationships over time. However, a cross-sectional design with single time-point measures of change suffices when the research purpose is to identify relationships within a less complicated conceptual framework, as was the case with this study.

Third, the causal steps mediation analyses in this study were based on linear regressions, which can show the strength of an association but cannot provide causal inferences concerning the relationships among the variables (Goddard et al., 2009;

Pang, 2010). To gather evidence of the directionality of the relationships postulated in this study, theoretical propositions and empirical evidence were taken from previous research. Further, the aim of the data analyses in this study was to determine whether the directional postulations were consistent with the data. Readers are cautioned that such consistency is not necessarily proof of a causal relationship, although it may lend support to it (Pang, 2010).

Fourth, this study used a limited convenience sample drawn from Hong Kong primary schools. However, random resampling via the bootstrapping method compensated, although was no substitute, for random sampling at the research design stage. Accordingly, random resampling via bootstrapping provides some degree of confidence that the results are indicative of, if not generalizable to, Hong Kong primary schools territory-wide. Although preliminary, the findings suggest that similar patterns would be found if a larger random sample were used.

Fifth, subjective teacher-reported data may "include individual bias from the respondents, thus affecting the answers' accuracy to some degree" (Kline, 2011, p. 9). To limit individual bias, extreme values were identified and found to be within an acceptable range. Moreover, it was assumed that the respondents were honest in their answers and understood the questionnaire. It would be fruitful for further research to survey principals to present a complete picture of principal leadership in Hong Kong primary schools.

Sixth, the study focused on identifying the mediating effects of just a few of the human relational factors that operate within schools. Therefore, "the results of the data analyses are restricted to the variables and factors specified within the framework" (Pang, 2010, p. 263). In fact, many other features of school capacity are broadly associated with or known to contribute to teacher professional learning (Louis et al., 1994). Trust, communication, and collaboration constitute just a few. Although it is believed that the selection of variables in this study is defensible, data analysis was subject to the effects of variables omitted from the framework. More explicitly, although significantly positive mediating effects of the human relation components of school capacity were identified, the human relational factors

considered are just a few of the multiple factors that support teacher professional learning. To advance understanding of the effects of leadership forces on school improvement, future research needs to take a closer look at variables beyond human relations.

Finally, in answering recent calls for the testing of more comprehensive school capacity models or multilevel hierarchical models (e.g., Heck & Hallinger, 2011; Thoonen et al., 2012), this study has a number of strengths. By adopting a less complex conceptual framework, it focuses deliberately on the mediating effects of a few relational school capacity factors and explores both the nature and significance of their role in the mediated relationships. Considering the nested nature of the data, cluster effects were investigated in the mediation analyses, although they ultimately had to be ignored due to the limited number of clusters, which was set to 20 by default. There were 32 schools in the sample. Hence, the unit of analysis was individual teachers rather than schools. The proportion of the variance that may be explained by a higher-level hierarchical structure, i.e., the schools within which the teachers are clustered, cannot be evaluated using this methodology.

5.5 Summary

Chapter Five comprises six sections. It begins with a sequential presentation and discussion of the findings as they relate to each research question, with interpretations offered. The following section discusses the study's implications for research, practice, and policy, with recommendations made when appropriate. Then, the study's limitations are elucidated, with the measures taken to compensate for them highlighted. Following this brief summary, Section 5.6 concludes both this chapter and the thesis as a whole. In sum, the findings of this study indicate that the level of school capacity is significantly related to supportive principal behavior and teacher professional learning. Effective principals work to sustain school capacity by establishing and maintaining trust, communication, and collaboration, which in turn

facilitate teacher professional learning and teaching (Youngs & King, 2002).

5.6 Conclusion

This study examines the mediating effects of trust, communication, and collaboration on the relationship between principal leadership and teacher professional learning in Hong Kong primary schools, with the key finding being that all three exert significant, although varying, mediating effects on that relationship. Comparison of the three shows the mediating power of collaboration to be the strongest, followed by communication and trust. The indirect effects of principal leadership on teacher professional learning in the area of strategic direction via the three mediators were significantly negative in all tests. Conversely, the effects of staff management were always significantly positive. As expected, principals' leadership in the areas of teacher development and instructional leadership was found to have significant direct effects on teacher professional learning, although the indirect effects through the mediators were not significant. On the whole, the mediating effects of trust, communication, and collaboration account for an overwhelming proportion of the total effects of principal leadership on teacher professional learning. It is hoped that this confirmatory study will draw the attention of educational policymakers and practitioners to the extent to which school capacity mediates the relationship between principal leadership and teacher professional learning. Its findings produce new knowledge and extend the existing body of literature in the educational leadership arena.

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Appendices

Appendix A*:* Project introduction

香港小學中學校改進與學生學習之間的關聯

MISSING LINK II RESEARCH PROJECT

School Improvement and Student Learning in Hong Kong Primary Schools

為期兩年的「失落的環節 II」研究，由香港研究資助局資助。該項目參照在美國、加拿大及澳洲等地的學校改進研究結果，以香港為背景進行深入的實證研究。在「失落的環節 I」研究中，研究團隊調查了能夠有利於香港中學成功的學校改進條件。「失落的環節 II」將採用類似的方式對香港小學的學校改進進行研究，希望能更清楚了解香港的校長及教師可以如何創建學校改進及學生學習的可持續環境。

The 2-year *Missing Link II Project* is funded by the Research Grants Council of Hong Kong. It builds on school improvement studies conducted in the USA, Canada, UK and Australia by localizing the research for the Hong Kong context. In *Missing Link I* the research team examined conditions that contributed to successful school improvement in Hong Kong Secondary Schools. The *Missing Link II* project will use a similar approach to study school improvement in Hong Kong primary schools. Our goal is to develop a better understanding of how Hong Kong principals and teachers can develop conditions that contribute to sustainable school improvement and student learning.

Appendix B: Consent form

參與確認書

School Participation Confirmation

學校 School: _____

校長姓名 Name of Principal: _____

校長簽署 Signature of Principal: _____

聯絡人姓名 Contact Person's Name: _____

聯絡人職位 Contact Person's Position: _____

聯絡人電話 Contact Person's Phone No: _____

聯絡人電郵 Contact Person's Email: _____

_____ 我校現確認參與此項研究（香港小學中學校改進與學生學習之間的關聯）。

We confirmed that our school will participate in this project, including the **Online Teacher Survey**.

請把此表格傳真(2948 8634)予香港教育學院李丽娟小姐。

Please return this form to Miss Joanna Li Lijuan by fax (2948 8634).

謝謝你的關注。Thanks for your consideration.

Appendix C: Questionnaire for online teacher survey

Part I: Personal and School Information

Please tick the appropriate box (☐) and provide other requested information.

1. Gender 性別:	2. Age 年齡:	3. Highest Qualification 最高學歷:	4. My school name 學校名稱:
☐ 1 Male 男性	☐ 1 25-34	☐ 1 Certificate 證書	
☐ 2 Female 女	☐ 2 35-44	☐ 2 Bachelors Degree 學士學位	
	☐ 3 45-54	☐ 3 Masters Degree 碩士學位	_____
	☐ 4 55 or above	☐ 4 Doctoral Degree 博士學位	

Years of teaching (more than 6 months counted as 1 year) 教學年資（超過六個月以一年計）		Years in the current role (more than 6 months counted as 1 year)擔任現職的年資（超過六個月以一年計）	
5. in present school:	6. in total:共計	7. in present school:在本校	8. in total:共計
☐ 1 0-3	☐ 1 0-3	☐ 1 0-3	☐ 1 0-3
☐ 2 4-7	☐ 2 4-7	☐ 2 4-7	☐ 2 4-7
☐ 3 8-11	☐ 3 8-11	☐ 3 8-11	☐ 3 8-11
☐ 4 12-15	☐ 4 12-15	☐ 4 12-15	☐ 4 12-15
☐ 5 15-18	☐ 5 15-18	☐ 5 15-18	☐ 5 15-18
☐ 6 18 or above	☐ 6 18 or above	☐ 6 18 or above	☐ 6 18 or above

9.Administrative Job categories 行政工作類別 (Please choose as appropriate 請選擇合適的類別)

☐$_1$ Vice-Principal 副校長

☐$_2$ Person in Charge of Functional Group 行政組負責人 ☐ Administration 行政管理 ☐

☐$_3$ Panel Chair 科組主任, My subject panel is 我負責的教學科組是:

☐$_4$ Not in Charge of Any Administrative Work 非行政類別負責人

10. Main Teaching Subject area 主要任教科目

Part II: Questionnaire items measuring teacher perception of principal leadership

A. ***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)

		Not at all	Very little	Little	Par-tially	A lot	Very Significantly
1.	Help clarify the reasons for our school' improvement initiatives.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
2.	Give staff a sense of the overall purpose of the school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
3.	Provide assistance to staff in setting goals for teaching and learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
4.	Integrate school priorities with the government policy agenda.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
5.	Help train the school management team.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
6.	Develop leaders amongst the teachers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
7.	Promote a range of continuous professional development experiences for all staff.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
8.	Use coaching and mentoring to improve quality of teaching.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
9.	Encourage staff to think of learning beyond the academic curriculum.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
10.	Align staff professional development activities with school development.						
11.	Assign work to staff in accordance with their capabilities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
12.	Show appreciation for teachers' outstanding performance.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
13.	Provide timely performance feedback to teachers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
14.	Handle grievances amongst teachers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
15.	Improve the performance appraisal system.						
16.	Maintain cooperative relationship with parents.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
17.	Engage parents in the school's improvement effort.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
18.	Develop strategies to promote the school to the community.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
19.	Establish a professional network with educational communities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
20.	Allocate resources strategically based on student needs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
21.	Demonstrate an ability to secure additional resources for the school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
22.	Utilize support (auxiliary) staff for the benefit of student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
23.	Provide or locate resources to help staff improve their teaching.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
24.	Establish a structured quality assurance mechanism in school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
25.	Create a culture of accountability among teachers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
26.	After observing classroom activities, work with teachers to improve their teaching.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
27.	Use student assessment data to inform school strategic planning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
28.	Regularly observe classroom activities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
29.	Regularly inspect student homework.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
30.	Initiate school-based instructional projects.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
31.	Encourage staff to consider new ideas for their teaching.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
32.	Design measures to improve student learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
33.	Articulate high expectations for student academic achievement.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Part III: Questionnaire items measuring teacher perceptions of school capacity

	B To what extent do you believe that your school has the following features:	Dis-agree Strong-ly	Dis-agree mode-rately	Dis-agree slight-ly	Agree slightly	Agree mode-rately	Agree strong-ly
1.	We handle our work with competence and confidence.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
2.	We approach our work professionally.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
3.	We do not try to gain an advantage by deceiving others.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
4.	We can freely discuss our feelings, worries, and frustrations.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
5.	Meetings in our school are effective and efficient.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
6.	There is a reasonable number of meetings in our school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
7.	We have timely information to complete our jobs.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
8.	The principal always keeps colleagues informed about new development of the school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
9.	We provide and receive support from our colleagues to accomplish tasks.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
10.	Teachers in our school regularly discuss about possible ways to improve student performance.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
11.	Teachers are encouraged to develop and implement new practices.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
12.	We share our best practices with other colleagues.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
13.	There is ongoing collaboration among teachers in the same subject panel.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
14.	We can accomplish more through working in small teams.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
15.	There is ongoing collaboration among teachers in different subject panels.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
16.	The school timetable provides adequate time for collaborative teacher planning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
17.	Our team members ‘swim or sink’ together.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
18.	Our team members want each other to succeed.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
19.	Our team members seek compatible goals.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
20.	The goals of team members go together.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
21.	When our team members work together, we usually have common goals.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Appendix D: Bootstrap results and effect sizes for indirect effects of Trust on the relationship between Principal Leadership change and Teacher Professional Learning

Bootstrap Results for Indirect Effects	Indirect Effects of IV on DV Through the Mediator				Bias Corrected and Accelerated Confidence Intervals		Bias Corrected Confidence Intervals		Percentile Confidence Intervals	
	Boot Mean	Boot SE	Boot LLCI	Boot ULCI	Lower	Upper	Lower	Upper	Lower	Upper
Trust	.067	.021	.026	.110	.029	.110	.028	.109	.028	.108

Effect Size Indices for Indirect Effects	Effect	Boot SE	BootLLCI	BootULCI
Ratio of indirect to total effect of X on Y (ab/c)	.316	.075	.153	453
Ratio of indirect to direct effect of X on Y (ab/c′)	.462	.161	181	.827
R-squared mediation effect size	.041	.016	.013	.076
Preacher and Kelley (2011) Kappa-squared	.099	.030	.039	.157

Notes:

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

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Appendix E: Bootstrap results of the direct, indirect, and total effects of the seven core areas of Principal Leadership change on Teacher Professional Learning through Trust

Dimensions	Direct Effects		Direct Effects Through *Trust*				Total Effects	
	Effect	SE(boot)	Effect	SE(boot)	LLCI	ULCI	Effect	SE(boot)
Strategic Direction	-.157***	.034	-.078*	.034	-.149	-.0156	-.235***	.045
Teacher Development	.085*	.038	.015	.042	-.070	.092	.100 *	.049
Staff Management	.128**	.037	.096*	.029	.041	.154	.224***	.048
External Communication	.033	.038	-.006	.030	-.065	.054	.027	.050
Resource Management	-.031	.042	.018	.036	-.053	.089	-.013	.055
Quality Assurance	-.055	.044	.013	.040	-.060	.091	-.043	.058
Instructional Leadership	.128**	.038	.002	.039	-.072	.079	.130*	.052
OMNIBUS			.020	.011	.004	.036		

Appendix F: Bootstrap results and effect sizes for mediating effects of Communication on the relationship between Principal Leadership change and Teacher Professional Learning

Bootstrap Results for Indirect Effects	Indirect Effects of IV on DV through the Mediator				Bias Corrected and Accelerated Confidence Intervals		Bias Corrected Confidence Intervals		Percentile Confidence Intervals	
	Boot Mean	Boot SE	Boot LLCI	Boot ULCI	Lower	Upper	Lower	Upper	Lower	Upper
Communication	.136	.021	.096	.178	.109	.197	.110	.197	.109	.197

Effect Size Indices for Indirect Effects	Effect	Boot SE	BootLLCI	BootULCI
Ratio of indirect to total effect of X on Y (ab/c)	.717	.086	.576	.916
Ratio of indirect to direct effect of X on Y (ab/c′)	2.530	73.963	1.346	10.023
R-squared mediation effect size	.070	.018	.037	.110
Preacher and Kelley (2011) Kappa-squared	.220	.027	.165	.270

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.

Appendix G: Bootstrap results of the direct, indirect, and total effects of the seven core areas of Principal Leadership change on Teacher Professional Learning through Communication

Dimensions	Direct Effects		Direct Effects Through *Communication*				Total Effects	
	Effect	SE(boot)	Effect	SE(boot)	LLCI	ULCI	Effect	SE(boot)
Communication								
Strategic Direction	-.076*	.035	-.159*	.034	-.229	-.097	-.235***	.045
Teacher Development	.027	.038	.074	.039	-.003	.150	.100 *	.049
Staff Management	.045	.037	.179*	.035	.113	.250	.224***	.048
External Communicat	.020	.038	.006	.030	-.052	.068	.027	.050
Resource Management	-.057	.043	.044	.034	-.023	.112	-.013	.055
Quality Assurance	-.011	.045	-.031*	.037	-.104	.043	-.043	.058
Instructional Leadership	.108**	.040	.022	.035	-.046	.089	.130*	.052
OMNIBUS			.071	.014	.043	.097		

Appendix H: Bootstrap results and effect sizes for mediating effects of Collaboration on the relationship between Principal Leadership change and Teacher Professional Learning

Bootstrap Results for Indirect Effects	Indirect Effects of IV on DV through the Mediator				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.

Appendix I: Bootstrap results of the direct, indirect, and total effects of seven core areas of Principal Leadership change on Teacher Professional Learning through Collaboration

Dimensions	Direct Effects		Indirect Effects through *Collaboration*				Total Effects	
	Effect	SE(boot)	Effect	SE(boot)	LLCI	ULCI	Effect	SE(boot)
Collaboration								
Strategic Direction	-.087**	.031	-.148*	.038	-.230	-.077	-.235***	.045
Teacher Development	.077*	.034	.024	.048	-.067	.120	.100 *	.049
Staff Management	.035	.033	.189*	.038	.115	.265	.224***	.048
External Communication	.030	.034	-.003	.034	-.069	.064	.027	.050
Resource Management	-.034	.038	.021	.040	-.061	.097	-.013	.055
Quality Assurance	-.045	.040	.002	.049	-.091	.101	-.043	.058
Instructional Leadership	.073*	.036	.057	.044	-.027	.144	.130*	.052
OMNIBUS			.083	.018	.048	.115		

Appendix J: Bootstrap results of the direct, indirect, and total effects of Principal Leadership change on Teacher Professional Learning through Trust, Communication, and Collaboration

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	
	Data	Boot	Bia	SE	Lower	Upper	Lower	Upper	Lower	Upper
Total	.180	.181	.000	.027	.127	.235	.127	.235	.127	.235
Trust	.030	.030	-.000	.010	.013	.052	.012	.052	.012	.051
Communication	.067	.067	.000	.012	.046	.091	.046	.091	.046	.091
Collaboration	.084	.083	-.000	.014	.059	.116	.059	.116	.057	.114
Contrasts										
Trust Vs. *Collaboration*	-.036	-.037	-.001	.013	-.062	-.013	-.061	-.012	-.062	-.013
Trust Vs. *Collaboration*	-.053	-.053	.000	.013	-.081	-.031	-.080	-.030	-.079	-.030
Communication Vs. *Collaboration*	-.017	-.017	.001	.015	-.049	.012	-.048	.012	-.047	.013

Effect Size Indices for Indirect Effects	Effect	Boot SE	BootLLCI	BootULCI
Indirect Effect of X on Y				
Total	.180	.028	.127	.237
Trust	.030	.010	.012	.052
Communication	.067	.012	.046	.091
Collaboration	.084	.014	.058	.116
Ratio of Indirect to Total Effect of X on Y				
Total	.848	.069	.722	.996
Trust	.143	.037	.073	.220
Communication	.312	.048	.231	.418
Collaboration	.392	.048	.308	.498
Ratio of Indirect to Direct Effect of X on Y				
Total	5.556	375.509	2.406	43.112
Trust	.936	62.656	.257	7.683
Communication	2.048	163.834	.850	16.055
Collaboration	2.573	150.738	1.079	2.098

Note. R-squared mediation effect size & Kappa-squared cannot be estimated for a model with multiple mediators.

Appendix K: Bootstrap results of the direct, indirect, and total effects of the seven core areas of Principal Leadership change on Teacher Professional Learning through Trust, Communication, and Collaboration

Effects & Dimensions	Direct Effects	Indirect Effects (through *Trust*)			Indirect Effects (through *Communication*)			Indirect Effects (through *Collaboration*)			Total Effects
	Effect	Effect	LLCI	ULCI	Effect	LLCI	ULCI	Effect	LLCI	ULCI	Effect
Strategic Direction	-.049	-.036*	-.075	-.008	-.070*	-.105	-.042	-.079*	-.127	-.040	-.235*
Teacher Development	.048	.007	-.033	.044	.032	.000	.069	.013	-.037	.064	.100 *
Staff Management	-.001	.045*	.020	.078	.079*	.049	.113	.102*	.061	.150	.224*
External Communication	.028	-.003	-.030	.026	.003	-.023	.030	-.002	-.036	.035	.027
Resource Management	-.052	.008	-.024	.043	.020	-.010	.050	.011	-.032	.055	-.013
Quality Assurance	-.036	.006	-.030	.044	-.014	-.047	.018	.001	-.049	.055	-.043
Instructional Leadership	.089*	.001	-.034	.037	.010	-.020	.040	.031	-.015	.079	.130*
OMNIBUS		.009	.002	.017	.031	.019	.045	.045	.025	.065	