HOW LEADERSHIP IS DISTRIBUTED AND HOW IT IS ASSOCIATED WITH TEACHING QUALITY? A CROSS-COUNTRY STUDY WITH THE TALIS 2013

By

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A DISSERTATION

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ABSTRACT

HOW LEADERSHIP IS DISTRIBUTED AND HOW IT IS ASSOCIATED WITH TEACHING QUALITY? A CROSS-COUNTRY STUDY WITH THE TALIS 2013

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Contemporary school principals are required "to play managerial, political, instructional, institutional, human resource and symbolic leadership roles in schools" (Hallinger, 2003, p. 334). For this reason the concept of distributed leadership has evolved, which articulates principals need to develop a shared vision and empower the teachers with expertise to build strong organizational capacity. Though empirical evidence grows steadily, there still lacks the complete evidence on how each of the school leadership function needs varied skills and expertise (Leithwood et al., 2007). This current study intends to measure the extent to which school leadership roles are collectively fulfilled by formal leaders who have the position and informal leaders who have the expertise, in order to compare the variations among countries and schools, and further to explore the correlation between distributed leadership and school human capital.

Using the 2013 Teaching and Learning International Survey administered by OECD with 32 countries' public data, and applying rigorous quantitative approaches (Item Response Theory, Hierarchical Linear Model and meta-analysis), this study has successfully revealed that significant variation exists among countries regarding how the school fulfils each of the five leadership functions (setting direction, managing instruction, hiring people, setting school incentive structure and developing people) by either collaborating with or excluding teachers and school community. The pattern of involving informal leaders in managing instruction and

developing people is prevailing in certain countries and areas. Most importantly, the metaanalysis results synthesizing 32 countries' HLM effects indicate informal leaders' participation in instructional management and teacher development is as significant as formal leaders in predicting teaching quality, as a matter of fact, informal leaders' leading role in hiring is more important than formal leaders to recruit high-quality teachers.

Keywords: Distributed Leadership, leadership functions, formal leaders, informal leaders, organizational capacity, school improvement, teacher quality, quantitative research, HLM, latent trait method, meta-analysis

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CHAPTER 1: DISTRIBUTIVE LEADERSHIP AND TEACHING QUALITY Introduction

As a former teacher consultant who spent considerable time exploring school leadership and teacher professional development, I perceived that the schools where principals and position holders intentionally distribute leadership to teachers were more likely to achieve school success. This observation was validated by Hargreaves and Shirley (2012) who conducted case studies in high performing countries like Finland and Singapore, and revealed that the effective schools generally have stronger organizational capacity to proactively involve a broad base of the stakeholders, and to arouse the greatest potential of human and social capitals in fulfilling school functions (Dimmock, 2012; Hargreaves & Fink, 2006)

As a matter of fact, under the circumstance when principals' responsibilities increase in complexity with accountability demands for better student achievement (Leithwood, Louis, Anderson, & Wahlstrom, 2004), researchers argue that the principal can no longer successfully lead a school and accomplish all responsibility alone (Bennett, Wise, Woods, & Harvey, 2003; Harris, 2011; Hartley, 2007; Spillane, 2006). Indeed, schools have to be led in a collaborative manner with shared decision-making through a distributed leadership model (Gronn, 2002; Harris, 2008; Leithwood, Mascall, & Strauss, 2009; Spillane & Diamond, 2007). The leader who implements distributed leadership will intensify schools' organizational capacity for schools to transform and improve (Heck & Hallinger, 2009; Marks & Printy, 2003) by taking fully advantage of intellectual capital including knowledge, skills, values and dispositions of faculty and staff, and social capital like trust, respect, collegiality and team work spirit (Dimmock, 2012; Hargreaves & Fink, 2006). When the leader promotes distributed leadership, the school academic capacity is increased (Heck & Hallinger, 2009) and the school becomes a collaborative

and supportive environment for teachers to take leadership roles and fully engage in instructional practice (Crowther, Ferguson, & Hann, 2009; Harris & Muijs, 2005; Jackson & Bruegmann, 2009).

Though the concept of distributed leadership has been fervent in the last decade as the promising approach of improving school effectiveness, the research on this emerging leadership style has been stuck at the stage of definition clarification and taxonomy development for a long time (Bolden, 2011; Spillane, 2012; Thorpe, Gold, & Lawler, 2011; Tian, Risku, & Collin, 2015). The empirical evidence, which has been gradually developed since last decade, increasingly supports the relevance of distributed leadership to organizational culture, teacher efficacy, optimism and so on (Angelle, 2010; Boudreaux, 2011; Camburn, Rowan, & Taylor, 2003; Devos & Hulpia, 2009; Harris, Leithwood, Day, Sammons, & Hopkins, 2007; Heck & Hallinger, 2009; Hopkins & Jackson, 2002; Hulpia, Devos, Rosseel, & Vlerick, 2012; Rosseel, Devos, & Hulpia, 2009). However, there still exists a giant gap in the literature towards a panorama of distributed leadership for it managerial landscape and relevance to many school aspects (Harris, 2011; Spillane, 2012; Tian et al., 2015). The research base has not yet been fully established regarding how leadership is distributed for specific leadership roles, and how leadership distribution is linked to school human development and success in a comprehensive framework.

The research I proposed was grounded on the belief that increased accountability requirement for managing schools with an instructional emphasis is beyond the capacity of any individual leader. This assumption calls for implementation of a distributed leadership model that involves teachers with required expertise and skills to successfully fulfill many school leadership functions (Crowther et al., 2009; Leithwood et al., 2007; Spillane & Diamond, 2007);

and the involvement of teachers in leadership functions can potentially develop their professionalism and instructional expertise in the school.

Statement of the Problem

Due to the changes in how leadership functions are expected and operated in schools, in responding to equitable and increased student performance, the conceptual framework of school leadership is changing (Heck & Hallinger, 2009; Leithwood et al., 2009; Spillane, 2012). Currently, researchers and practitioners argue and tentatively believe a distributed leadership pattern that has multiple leadership centers has the potential to improve schools (Spillane, 2012; Tian et al., 2015). Since last decade, the distributed leadership literature has boomed with an emphasized on theoretical development (Gronn, 2008; Harris, 2009a; MacBeath, 2005); though empirical evidence about distributed leadership is developing, it is still far less complete (Bolden, 2011; Jones et al., 2011; Spillane, 2012; Tian et al., 2015).

Available works, largely qualitative in nature, has generated preliminary insights into how leadership is formed (Leithwood et al., 2007) in different contexts (Spillane & Diamond, 2007). Research also has suggested benefits of adopting distributed leadership (Camburn et al., 2003; Heck & Hallinger, 2009; Hulpia et al., 2012; Lashway, 2006; Marks & Printy, 2003; Timperley, 2005; Woods & Roberts, 2015). However, contemporary studies of distributed leadership are not readily available in quantitative measurement of operational images of distributed leadership in the school for multiple school roles.

Organizational capacity consists of both human capital and social capital (Dimmock, 2012). Former research regarding the effect of distributed leadership has primarily provided evidence on how distributed leadership in school system has promoted school social capital like trust and teacher efficacy (Angelle, 2010), academic capacity (Heck & Hallinger, 2009),

optimism (Mascall, Leithwood, Straus, & Sacks, 2008) and organizational commitment (Hulpia et al., 2012; Hulpia, Devos, & Van Keer, 2009), but there is little associating the dimensions of leadership distribution with human capital, whether qualitative or quantitative research. A landmark study by Marks and Printy (2003) was one of the few that provided the evidence of substantial impact shared instructional leadership aligned with transformative leadership has on teacher pedagogical quality. A study done by Leithwood and Jantzi (2012) on collective leadership practice in the school also found its positive impact on teacher knowledge for teaching. However, there lacks the research to explore how the extent to which leadership is distributed can be related to comprehensive school teaching quality, which is the essential of school capacity. Theoretically, the schools with leadership distribution will create a collaborative and supportive environment that welcomes teachers' contribution into school decision making and management (Barth, 2001; Elmore, 2000; Lashway, 2006), in turn helping teachers learn and develop robust pedagogical skills in an collaborative environment.

There is No Evidence on How People are Involved in Leadership Functions in the School

The current body of literature does not include rigorous quantitative studies measuring whether people from different levels of school configurations take on various leadership functions, and how frequent and intensely they are involved in each of the leadership roles. As mentioned above, most available studies focused on description of leader distribution gained through qualitative inquiry, exploring the reasons, the impetus and the formation for distributed leadership (Bennett et al., 2003; Bolden, 2011; Spillane, 2012). Collectively, research findings and conceptual development describe the contributions multiple individuals make to the practice of distributed leadership (Gronn, 2002; Harris, 2009a; Spillane, 2012).

Yet, it is difficult to discern how the involvement authentically happens with a pattern

based upon the available studies. Leadership distribution is not simply dispersing or sharing leadership from top to the related people (Spillane, 2006). It is a process of involvement and interaction as individuals step up to fulfill the requisite leadership functions (Leithwood & Seashore-Louis, 2011; Spillane, Halverson, & Diamond, 2004). As there are multiple essential leadership functions in the school (Hallinger & Murphy, 1985; Heck & Hallinger, 1998, 2009; Leithwood et al., 2007), there will be various expertise, knowledge and skills needed for fulfilling each of the functions strategically and efficiently. Consequently, it is vital to have evidence available for the pattern of "who, how and how much" different people in the school system are involved in particular leadership roles.

There is No Evidence on How the Extent of Leadership Distribution Impacts Teachers

As research into distributed leadership continues, calls have come for solid research evidence to relate distributed leadership to school effectiveness and various school aspects (Harris, 2009b; Thorpe et al., 2011; Tian et al., 2015). In recent years, some studies have provided the evidence about the impact of distributed leadership on school aspects like teacher efficacy, organizational affiliation, increased trust, job satisfaction and teacher retention (Angelle, 2010), escalated school academic capacity (Heck & Hallinger, 2009), teachers' academic optimism (Chang, 2011; Mascall et al., 2008), organizational commitment (Hulpia et al., 2012; Hulpia et al., 2009) and so on. Some research also intended to link distributed leadership with student test scores as well (Boudreaux, 2011; Davis, 2009; Gordon, 2005; Heck & Hallinger, 2009; Terrell, 2010), though the findings were inconsistent. Heck et al (2009) proved leadership exerts indirect impact on students and their achievement through teachers. Marks and Printy (2003) proved integrated shared instructional leadership is substantially related to teacher pedagogical skills. However, research that links distributed leadership with

comprehensive teacher quality has not been fully embraced to date, though teacher quality is held as an important predictor of student effectiveness (Darling-Hammond, 2000; Goe, 2007; Guo, Connor, Yang, Roehrig, & Morrison, 2012; Hanushek & Rivkin, 2006; Sanders, Wright, & Horn, 1997). By extending the investigation of the association between distributed leadership and teacher quality is an important step in the field. A greater direct impact on teachers through leadership distribution might improve the work teachers do. Positive findings would inform both policy makers and practitioners in ways to redesign school organizations to support shared school leadership functions in order to build collaborative environments for teacher development.

Figure 1: What is missing from Distributed Leadership Literature?



There is No Comparative Study on Distributed leadership Across National Boundaries

As mentioned earlier, international benchmarking study done by Hargreaves and Shirley (2012) claimed schools in high-performing countries like Finland and Singapore generally have stronger organizational capacity. The panacea for them is to proactively mobilize all the school capacity by empowering people and holding all the stakeholders accountable for school success. If distributed leadership, especially a shared responsibility is the panacea for the schools to be more effective in the high-performing countries, there need empirical evidence to compare the variations between high-performing and low-performing countries and reveal whether the leadership distribution patterns vary across national boundaries.

Theoretical Framework

Theoretical Development of Distributed Leadership

Gibb, in 1954, initially articulated the specific term 'distributed leadership' to capture the idea of individuals at different levels of an organization leading jointly and cooperatively toward a common goal (Gronn, 2002). The term has attracted different meanings and is associated with a range of practices, though currently the literature is supporting a diverse, broad-based definition without convergence (Bennett et al., 2003; Bollen, 1989; Harris et al., 2007). In general, distributed leadership belongs to post-heroic leadership perspective, which examines the formation, framework and operation of multi-level cooperative management and leadership by interacting individuals. It is commonly understood as direction-setting and influential practices performed by different people from multiple power center instead of one predominant leader (Bennett et al., 2003; Bollen, 1989; Gronn, 2002, 2008; Leithwood et al., 2007; Spillane, 2006)

Gronn (2002) claimed that distributed leadership could be viewed from two broad perspectives: an 'additive perspective', and a 'holistic perspective'. He advocated for the idea

that distributed leadership is a 'concertive action' in a holistic sense that a group of people come together to contribute to accomplishing goals and that the result is more than the sum of individual work. Spillane and Diamond (2007) further developed the holistic viewpoint and interpreted that in the distributed leadership model all the individuals with skills and expertise are involved in leadership beyond just formally designated leaders ("leader plus"); the practice of leading, at its best, results from 'consciously managed and synergistic interactions of school leaders, followers, and aspects of their situations' (p, 7). Moreover, Leithwood and his colleagues (2007), through their qualitative study, confirmed contribution of informal leaders in three of the five leadership functions they proposed (redesigning the organization, developing people, and managing the instructional program); nevertheless, they argued informal leaders' work still had to be regularly monitored by principals. Distributed leadership depends on "effective forms of focused leadership – leading the leaders" (Leithwood et al., 2007, p. 55). They mentioned task complicity as a key variable shaping productive leadership performance; more directive form of leadership is productive when the tasks are relatively simple, while more participatory forms of leadership work better for complex tasks. This last point is important when contemplating the possible relationship between leadership distribution and teacher quality, since teaching is complex conceptual work (Danielson, 2013; Stronge, 2007). The existing theoretical and empirical evidence depicts leadership distribution from holistic perspective emphasizing multi-leaders' involvement (Barth, 2001; Bolden, 2011; Lashway, 2006), synergistic interaction among leaders and followers within a particular social context (Spillane, 2006) and linking distributed leadership with instructional practice (Elmore, 2000) **Leadership Functions**

Leithwood and his colleagues (Leithwood et al., 2007; Leithwood & Seashore-Louis,

2012) proposed four leadership functions in the school as setting the school vision, developing people, managing instructional practice and reconstructing schools. The vision of the school is the direction to guide the school's operation and development. Sharing leadership to teachers and making shared vison incorporates teachers' subjective wishes in the schools development, which increases the people's dedication to the collective outcomes (Hulpia et al, 2012). Researchers argue that including teacher in school decision making and operation has the potential to create a positive collective learning environment (Harris & Muijs, 2005; Lambert, 2006; Lashway, 2006). In terms of instructional practice, schools are loosely-coupled system ((Weick, 1976) that each individual teacher has autonomy for their own teaching for teaching content, methodology and process. Distributed leadership incorporates activities of experienced teachers in guiding new or less experienced teachers in a loosely structured setting without the principal's direct supervision. Therefore, teachers are proactively involved in instructional practice of each other and developing people in the school. (Elmore, 2000; Halverson, Diamond, & Spillane, 2004; Hargreaves & Fink, 2006)

Distributed Leadership Would Impact Teachers

Inside school, teacher quality is held to be the most important component for improvement of school organizational capacity (DuFour & Mattos, 2013). Teachers enter schools with certain capacity for teaching, but teacher quality is not a fixed parameter; teachers in different schools actually develop at dissimilar paces due to school support and climate for learning (Jackson & Bruegmann, 2009). Ingersoll (2012) argued that schools are actually very centralized places where teachers have little power, influence and control over many key decisions towards staffing, tracking, budgeting and even instructional programs and practices, but the degree of the control teachers own will shape how well the school functions and degree of teachers'

collaboration and learning. (Jackson & Bruegmann, 2009) found out students achieved larger gains when their teachers received help from more experienced and effective colleagues. Former research has also provided evidences regarding how involvement of teachers in leadership responsibilities impact teachers' commitment (Hulpia et al., 2012), optimism (Mascall et al., 2008), trust(Angelle, 2010) and so on. Leithwood and Jantzi (2012) found out through their quantitative study that collective leadership has a positive impact on teacher instructional knowledge though they did not confirm the positive relationship between leadership and student achievement. In a distributed leadership model, a school's collaborative environment could create conditions for teacher to develop expertise by working together (Crowther et al., 2009; Harris & Muijs, 2005). When teachers step into leadership roles, they gain leadership skills and fully engage in their instructional practices (Lashway, 2006), which, arguably, would improve teaching and learning.

Conceptual Framework for This Study

From what I reviewed about the theory of distributed leadership, the leadership functions and the impact distributed leadership has on teachers, the current study proposed four leadership distribution patterns combining former theories (Spillane et al., 2007; Leithwood et al., 2007) to investigate the involvement of both formal and informal leaders for the specific leadership function. These four patterns emphasize how the leadership is distributed through the lens of the extent of participation from two-level management in the school. Specifically, these four patterns are Collective Network, Cooperative Network, Hierarchical Coordinated and Uncertain Management. Each form is displayed in a two by two matrix, resulting from the combination of the involvement from both formal and informal leaders into different leadership roles as either high or low. The pattern of distributed leadership for each leadership function might be different based on who and how the leaders participate under particular situation.

Figure 2: Four Quadrants of Distributed Leadership Patterns Proposed for This Study



Note: Formal Leaders: The Principal & Management Team Informal Leaders: Teachers and Governing Board

In addition, the research is to relate the dimension of distributed leadership with the comprehensive quality of teacher and teaching. The conceptual framework developed for this study is demonstrated in figure 3, which has the pattern of leadership distribution as independent variable and teaching quality as dependent variable. The measurements of distributed leadership and teaching quality in particular schools are through the latent variables generated from a complex procedures of latent trait method; the hypothesis is that the collective network and cooperative network that have more informal leader's participation would yield higher teaching quality.

Figure 3: The Conceptual Framework of Distributed Leadership and Its Relation with Teacher Quality



Research Questions and Design

This research intends to investigate how both formal and informal leaders are involved in each of the leadership functions across countries, and how the pattern of distributed leadership is related to a cross-sectional measure of teaching quality using 2013 Teaching and Learning International Survey (TALIS) 2013 data that had public data for 32 countries (OECD, 2014).

The formal leaders in this research include the principal and the management team, while informal leaders consist the governing board, the mentors and the teacher. These five levels in the data were classified by the TALIS 2013 survey (local, state and federal authority was not include in this study), while the grouping of formal and informal leaders was based on the theory and exploratory data analysis in TALIS 2013 core survey (lower secondary level). The questions asked specifically as

RQ 1: How is leadership distributed between formal and informal leaders for each of the leadership functions across countries?

RQ 2: How do schools with varying patterns to distributed leadership differ according to their contextual condition and principal characteristics?

RQ 3: What is the relationship between the pattern of distributed leadership and teaching quality?

Figure 4: Research Questions and the Development of the Research Questions



Exploratory factor analysis was first used to extract appropriate factors regarding distributed leadership functions from the TALIS principal questionnaire that shared by formal and informal leaders, and the teaching quality indicators come from the TALIS teacher questionnaire.

After identifying items from the survey, I used Item Response Theory to verify the latent construction, and to generate latent scores. Item Response Theory generates continuous variable

from categorical manifests (Langeheine & Rost, 2013). All the latent variables were standardized for comparative purpose among countries. The mean of the distributed leadership latent variables for each country were used for a scatter plot analysis for a two by two matrix to reveal the pattern of leadership distribution between formal and informal leaders. A quadrant was overlaid on the scatterplot, with the axes placed at the midpoint of the scaled score on each group's participation measure.

Based on the distribution of leadership distribution patterns on the quadrant, I then created a categorical variable of four scales. The categorical variables are Collective Network (4) that have high level of participation from both leader groups; Cooperative Network (3) has a high level participation by informal leaders but low level of participation by formal leaders; Hierarchical Coordinated (2) and Uncertain Management (1) have low level involvement by informal leaders but have either high level or low level of formal leaders' involvement respectively. The categorical variables was used as a dependent factor to compare sampled schools' contextual and compositional features by variance analysis.

In the second phase, Hierarchical Linear Modeling will be used first to relate the extent of leading role by formal leader and informal leader to teaching quality. Distributed leadership is conceptualized as a school level (second level) variable while teaching quality is an individual level (first level) variable. A set of controls were used at each level (school and principal factors at level two and teacher level factors at level one). After each individual country's model was fitted, a meta-analysis was conducted to synthesize the findings from the 32 countries for the final investigation of the correlation between distributed leadership and teaching quality.

Figure 5: Hierarchical Linear Model of Distributed Leadership and Teacher Quality



Contributions to Educational Research and Policy

The study is important in developing explicit understanding of how principals achieve school effectiveness by sharing leadership and involving appropriate people with expertise in making school decisions and operating the instructional program. Amidst ever increasing financial, instructional, managerial and technological reform and accountability requirements, a principal is incapable of making all decisions and helping all teachers with different subject content knowledge, varying pedagogical skills and differing needs for support. There is need to arouse the interest of policy makers to involve leadership distribution in their agenda and set up regulations and guidelines for the principal to follow. Consequently, it is important to have empirical evidence to demonstrate patterns of leadership distribution and how the distribution could benefit the teachers and the school as a whole. Learning the ways in which principals understand and operate leadership distribution may shed some light on how principals could make change happen in the schools. The promise is that distributed leadership may be a relatively inexpensive approach that has big impact on teachers' professional growth and school success.

With a clear understanding of distributed leadership and its beneficial outcome to school intellectual capital, principals may become more supportive of the policy if the necessary knowledge and training is more targeted and specific to develop principals. With well- designed and -supported programs of support, principals might be motivated to involve more teachers with requisite expertise in leadership; this, in turn might improve teaching quality and school success.

Structure of the Dissertation

This dissertation sets out to explore the understanding of distributed leadership practice in schools and the connection between it and teacher quality. Given the current recognition of the complexity of school and the acknowledgement that leadership is required from more than one person, the questions for exploration, as outlined above, focus on collective fulfilment of leadership responsibilities for a distributed leadership model and how that can impact teaching in schools. Within the first question, who are involved in distributed leadership? The key emphasis will be on all the people who have a hand in leadership role, which includes formal leaders and informal leaders; for example, principal, leader team, grade level leaders, and teachers that have expertise to make the influence in school decision.

Many of the concepts or themes outlined in this research are addressed in the literature on distributed leadership. Chapter Two explores and critiques this literature. In particular, the work of Gronn, Spillane and Leithwood are highlighted, moreover, distributed leadership concepts are linked to the quality of teacher and teaching. Key features are identified and used to form an understanding of distributed leadership and teacher quality for this research.

The research used the complex survey data TALIS 2013. Chapter Three explains the data structure, outlines the quantitative research methodology used and the reasons for choosing that methodology.

Chapters Four presents the analysis and findings with regards to who are involved in the leadership distribution for each leadership function and what is the variation for leadership distribution pattern among 32 participating countries. This chapter also examines how leadership distribution varied among schools as featured by schools' contextual and compositional factors, and the principal background. The last section was the analysis linking distributed leadership with teacher quality using HLM and meta-analysis.

Chapter Five is a chapter with the summary of the research design, questions asked, conduction of the analysis and findings, as well as the emphasis on the suggestion for further research and the limitation of the current study.

The concluding chapter, Chapter Six, synthesizes the data, refers to relevant literature and presents overall conclusions from the research. Recommendations for policy implication regarding for how to help leaders successfully distribute leadership in the school with increasing accountability demand and instructional guidance.

CHAPTER 2: THEORETICAL AND CONCEPTUAL FRAMEWORK FOR THE RESEARCH

This chapter explores and critiques the theoretical and research base for distributed leadership in schools. In section 2.1, the general conceptual understanding and classification of current literature on distinctive features regarding taxonomy, reasons and formations of distributed leadership are discussed. Additionally, the theories by protuberant researchers on distributed leadership, Spillane and Leithwood, will be especially emphasized in order to lay the foundation for this study. This section will outline the key features of distributed leadership, defining a conceptual framework and proposing four patterns of distributed leadership with the consideration of who are involved in each of the leadership responsibilities that need different skills and expertise, in order to depict a conjoint effort by both the formal and informal leaders in school leading. Section 2.2 will sketch the current research regarding the connection between distributed leadership and teacher development, which provides the rationale for the second phase of this research regarding how different leadership distribution patterns will have an impact on teachers and teaching. Section 2.3 will explore the conceptualization of teacher quality and measurement that will be used in this study as the dependent variable. Drawing on the insights from research literature, this chapter is dedicated to develop key conceptual understanding of distributed leadership and its potential impact on teachers in schools. The emphasis is to provide rational and conceptual framework for the research questions, and guide the secondary analysis procedures for the exploration in this study.

Available Theoretical Evidences of Distributed Leadership

Since 1954 when Gibb initially termed distributed leadership (Gronn, 2002), the literature offers a number of different expressions akin to the notion of leadership distribution, such as

'delegated leadership', 'dispersed leadership,' 'shared leadership', 'collaborative leadership', 'collective leadership,' and 'democratic leadership.' These terms are used in "some cases interchangeably, while most researchers deliberately make elaborate distinctions among the terminologies" (MacBeath, Oduro, & Waterhouse, 2004, p. 10) as they seek to understand and verify the undefined framework, process, and impact of distributed leadership in the organization. As reported earlier, much research on distributed leadership focuses on the conceptual and theoretical frameworks (Gronn, 2002, 2011; Gunter, 2005; Harris, 2006; Leithwood et al., 2007; MacBeath, 2005; Spillane, Halverson, & Diamond, 2001; Thorpe et al., 2011), the description of the practices along with the necessity for leadership distribution in schools (Barth, 2001; Elmore, 2000; Hartley, 2007); and the mode in which leadership distribution is operated across the leaders (Gronn, 2002, 2011; Gunter, 2005; Leithwood et al., 2007; MacBeath, 2005; Spillane & Diamond, 2007; Spillane et al., 2001; Thorpe et al., 2011; Timperley, 2005). Evidence-based studies, concerning the effects of distributed leadership on school aspects emerged recently, and these researches have focused on the effect of distributed leadership on a school aspect like school organizational commitment (Hulpia et al., 2012; Hulpia et al., 2009), affiliation, increased trust, job satisfaction and teacher retention (Angelle, 2010), academic capacity (Heck & Hallinger, 2009), teachers' academic optimism (Mascall et al., 2008), teacher pedagogical skills (Marks & Printy, 2003) and knowledge (Leithwood & Jantzi, 2012); as well as student achievement (Boudreaux, 2011; Davis, 2009; Gordon, 2005; Heck & Hallinger, 2009; Leithwood & Jantzi, 2012; Marks & Printy, 2003; Terrell, 2010),.

Generalized Features of Distributed Leadership in Available Literature

Along with the conceptual development of distributed leadership, there is ambiguity and inconsistency among the theoretical understandings of distributed leadership. In a

comprehensive review of available conceptual understanding of distributed leadership, the researchers (Woods, Bennett, Harvey, & Wise, 2004) generalized three key features for the available literature regarding distributed leadership:

- Distributed leadership is an emergent property of interaction
- Distributed leadership is the recognition of expertise
- Distributed leadership results from an openness of boundaries

Distributed leadership as an emergent property of interaction.

Distributed leadership is defined in the review as "an emergent property of a group or network of interacting individuals" (Woods et al., 2004, p. 441). Specifically, an influential researcher Gronn (2002) defined distributed leadership as 'concertive action' and suggested that distributed leadership features the conjoint activity. In his conceptual framework, distributed leadership provides people the opportunity to work together and pool their expertise into leading, therefore, the outcome is more than solely the sum of team members' individual actions.

Developed from Gronn's conceptual framework, Spillane defines distributed leadership as the collective properties that a group of leaders working together and the collective purpose of accomplishing one particular task ignites the leadership practice so the result of is more than only the sum of each individual leaders' contribution (Spillane et al., 2001, p. 21). Spillane specified distributed leadership as a necessary procedure that involves multiple people with expertise for a particular task, in his definition, the people involved in different tasks could be different. This is the biggest contribution of Spillane that includes context in the leadership distribution definition.

A key element of distributed leadership is teamwork that the people within a setting

work collaboratively for collective purpose (Lambert, 2002). However, the existence of a team along dose not necessarily catch the feature of distributed leadership, in Spillane's definition (2005), leadership practices go beyond formal structure, the process involves synergistic interaction among people as needed for particular purpose in a certain environment. As a result, leadership execution and people involved vary according to the task at the time. The team in each task does not necessarily operate as a hierarchical structure and team members change depending on the function and objective of the individual task. However, one the unchangeable feature is the synergistic interaction between people and the context. Only if the people interact for the collective purpose, the tasks could finally be accomplished.

Distributed leadership as recognition of expertise.

The expertise is essential for the people to be included in the leadership roles when leadership is distributed (Leithwood et al., 2007; Woods et al., 2004). Researchers like Spillane (2005) and Leithwood et.al. (2007) acknowledge that different tasks or leadership responsibilities will require different levels of expertise for the task to be accomplished (Fitzsimons, James, & Denyer, 2011; Hughes & Pickeral, 2013; Lambert, 2002). Contemporary schools are complex organizations with explicit demand for all students to be successful. The role of principal is now very complex including instructional guidance, teacher evaluation, allocating the resources, building school climate and so on, it is very unlikely that the expertise needed to achieve all school leadership roles will completely reside in the principal in order to support staff and supervise instructional practice (Hulpia et al., 2012). This is particularly true in the school for student leaning, because research has confirmed that leadership impact on learning is indirect through direct influence on teachers and process (Leithwood, Louis, et al., 2004). Teachers have the ultimate and most important impact on

their students learning in the classroom (Hanushek & Rivkin, 2006; Sanders et al., 1997).

Elmore (2000), along with Spillane (2006), argues that expertise, knowledge and skills needed for improving instruction in a school context are those that indirectly or directly lead to the instructional improvement and student accomplishment (Elmore, 2000, p.14). Therefore, the skills set that are needed in the school setting to promote instructional excellence are often from teachers that have accumulated the skills through their teaching. They have the prerequisite knowledge, skills and understanding of what is composed of good teaching and learning that is essential for school success. From Elmore (2000) and Lashway (2006), everyone has some skills in a school; therefore, distributed leadership acknowledges multiple sources of guidance contingent on the s of expertise in order to make coherent outcome (Elmore, 2000, p.15). This is one of the most important features that lays the foundation for distributed leadership. The process of distribution of leadership is not necessarily a structured institutional routine, it is actually to pool expertise from different sources together for the common goal. The process, as indicated before, is the natural flow of the expertise required for a specific school function or task, it is not resulted from the formal structure or mirrored rule of the school.

Distributed leadership suggests openness of boundaries.

Woods and his colleagues (2004) in their review also highlighted a third distinctive characteristic that distributed leadership is the result of pooled expertise from different resource so the boundaries have been removed for the collective purpose. From these perspective, several components need to be addressed, first of all, who are involved in the leadership roles. From many researchers, the leadership roles are not solely fulfilled by the principal and formal leaders, it could also include teacher, parent, students, or anyone that has

a hand in the leading (Harris, 2003; Leithwood et al., 2007; Spillane, Camburn, & Stitziel Pareja, 2007). Barth (2001) and Lashway (2006) argue that everyone in the school can lead, which further confirmed by Leithwood (2007) that teachers are proactively involved in three important school leadership roles among the four that they investigated. Harris and her colleague articulate that all teachers who possess leadership capabilities are willing to contribute to the school management and leadership in order to achieve the school success (Harris & Muijs, 2005, p.78). In all these arguments, they constantly convey a message that teachers without positons are involved in leading, the leading influence is not only from the circle of formal position holders. The second key is who should be involved in leading, and distributed leadership theories vary with different perspectives. Bath (2000) and Lashway (2006) articulate that everyone can lead. Leithwood et al. (2007), on the other hand, found that people with "organizational prototypicality", those are people who have good organizational fit and demonstrate organizational feature, can lead. Harris and Muijs stress the need for professional development and argue the professional leading community will create the opportunity for the teacher to lead, and the leading, interaction and engagement with the school functions will encourage the teacher to embrace the initiatives and innovations (Harris & Muijs, 2005). Though the theories differ in who should be involved in leading, they are consistent that teachers are tangible or intangible leadership team members. There is no strict boundaries for leading.

Formation and Implementation of Distributed Leadership

In order to clearly articulate the various ways in which distributed leadership may occur, a number of researchers have developed taxonomies. Gronn (2002) drew on two distractive perspectives. The <u>additive</u> perspective describes distributed leadership as 'the aggregated
leadership behavior of some, many or all of the members of an organization or an organizational sub - unit' (p.3,). The holistic perspective, however, considers distributed leadership as "an all-inclusive phenomenon that encompasses the practice of delegation, sharing, collaboration, dispersion and democratizing leadership in schools" (p.4). Gronn (2002) brings these both together in his conceptualization of distributed leadership as 'concertive action', which implies that a group of people pool expertise and skill (additive) in collaboratively and interactively (holistic) leading the organization. For Gronn (2002), distributed leadership is seen more as a 'unit of analysis' in a holistic sense and he brings forward three main patterns in concertive action as "spontaneous collaboration," "intuitive working relations" and "institutionalized practice," each of which could be considered as a manifestation of "conjoint agency" for leadership distribution (Gronn, 2002, p. 4-5). Spontaneous collaboration refers to unplanned interaction among individuals who pool their expertise to achieve the goal. Intuitive working relations involve some regulation and planning over time for individuals to rely on each other for task accomplishment. Institutionalized practice of distributed leadership is guided by formal institutional structures in a school with role assignments and institutional structure.

Leithwood et al. (2007) also emphasized on the emergent dynamics of distributed leadership. Leithwood and his colleagues (2007) investigated how distributed leadership pattern is consciously aligned across the emergent dynamic of leadership; their formations of distributed leadership have two essential components, one is whether there is institutional structure for distribution, and the other is whether there is planning for collective leading. The combination of these two components generate four patterns of leadership distribution as <u>planful alignment, anarchic misalignment, spontaneous alignment</u> and <u>spontaneous</u>

<u>misalignment</u>. From their research, they argue leadership distribution will a structured routine and planning will have the best impact on school effectiveness.

Spillane and Diamond (2007) take a holistic perspective whereby the individuals who provide leadership are highly interdependent on each other, and leadership takes shape in the interaction of all the individuals taking leadership responsibility within particular situations. They characterized the different types of co-leading as collaborated, collective and coordinated patterns. Collaborated co-leading requires multiple leaders to work together at one time towards a same leadership function; collective distribution may allow people's leadership to occur at different times but the leaders' work is interdependent and creates synergies for the accomplishment of one role; finally, leadership routines are performed in coordinated pattern, when work requires accomplishment of previous work. After tracking the daily leading activities of 42 American principals and their colleagues over a six-day period, Spillane and his colleagues (2007) found a combination of co-performed leadership and the principal performed leadership in the school. They reported that principals lead in the school for about two-thirds of the time, half of which is when they lead as a sole leader (Spillane et al., 2007), and the other half is when they lead with a colleague or colleagues. From their research, it is confirmed that teachers also lead in the school for about a third of the time (Spillane et al., 2007) though they did not specify when and for what leading roles the teachers were teaching by themselves.

Other researchers advance a more hierarchical notion of leadership distributed by someone to someone else. Macbeath and his colleagues (MacBeath, 2005) came to an understanding of distributed leadership as a continuously developing process under six headings, each of which demonstrates impetus, reason and pattern in which leadership is distributed from principal to capable teachers. Namely, leadership is distributed <u>formally</u>,

pragmatically, strategically, incrementally, opportunistically or culturally. Similarly, (Gunter, 2005) proposed his classification of distributed leadership and argued a more traditional and organized way of leadership distribution as empowered and delegated leadership. These two approaches achieve leadership distribution through formal institutional transmit from leaders to subordinates. Delegation is when the leader reallocates the work from one to another (between or within a level). Empowerment is an even more normative form comparing to delegation with inspired emotional commitment and structured format for sharing. But he also acknowledged bottom-up distribution approaches like dispersed and democratic leadership that the sharing of leadership was through natural flow of the work (Gunter, 2005).

| | Formal Distributio n | Spontaneous Distribution | Interdepend ent Interaction | Independent Relationship | Interaction with Situations |
|--------------------------------|--|--|---|---|-----------------------------------|
| Gronn (2000) | Institutionali zed practice; Intuitive working relations | Spontaneous collaboration | Holistic (Concertive action) | Additive | |
| Leithwood et al., (2007) | Planful Alignment | Spontaneous Alignment; Spontaneous Misalignment | Planful Alignment; Spontaneous Alignment | Anarchic Misalignment Spontaneous Misalignment | |
| Spillane et al., (2007) | | Leader plus | Collaborated co-leading; Collective distribution; Coordinated leadership | C | Emerges in practice |
| MacBeath et al., (2005) | Formal; Pragmatic; Strategic; Incremental; | Opportunistic; Cultural | | | |
| Gunter (2005) | Delegated; Empowered leadership | Dispersed; Democratic leadership | | | |

Table 1: Taxonomy of Distributed Leadership from Available Research

Each model above is grounded in the belief that a group of people with expertise, knowledge and skills work collaboratively to fulfill a task in distributed model. The conjoint leading could be more organized as a form of school routinized structure with formal assignment or more spontaneous and informal involving all people with expertise within particular situation. The people taking responsibility could interact interdependently and dynamically with each other towards a common goal, or their work would be separated and independent but conjointly contribute to complete the task. Collectively, the theories developed by former researchers suggested organized or spontaneous distribution, independent or interdependent relationship, involvement of and interaction with situation or not.

What's Still Missing from Available Literature?

As the concept and the empirical research about distributed leadership are relatively new, there is no one widely-accepted definition, and adequate empirical evidence on how leadership is distributed and whether leadership distribution makes a difference for school outcomes is thin (Bennett et al., 2003, Tian et al., 205). Among existing literature, Gronn (2002), Spillane (2006) and Leithwood et al. (2007) have taken important steps towards the conceptual understanding of distributed leadership. Their frameworks have provided a more manageable model for the leaders to rely on other people with expertise to fulfill leadership responsibility under various situations, and provide a scene that distributed leadership emerges in different forms as spontaneous or institutionally planful (Gronn, 2002; Gunter, 2005; Leithwood et al., 2007; MacBeath et al., 2005) , people collaborate with different orders as collaborated co-leading; collective network or coordinated leadership (Spillane et al., 2007), and the alignment with the leadership functions are different from case to case as either alignment or misalignment (Anderson, 2012; Leithwood et al., 2007). All the models provided in current literature go

beyond the "heroic" notion of the principal as instructional leader.

With all this in mind about the theories, there lacks empirical evidence to illustrate how both formal leaders and informal leaders are involved in school decision making under different situations, defined in this proposal by the five leadership functions (discussed next). Existing research has not explicitly revealed a pattern on how leadership is distributed through both hierarchical and heterarchical (lateral) models that involve multiple people in different roles. There is necessity to investigate the leadership manifestation between multi-level leaders within distributed leadership model and explore the pattern of leadership distribution for each of school leadership functions. What's more, though much research has focused on classification, there is still need for empirical evidence of distributed leadership on many school aspects (Tian et al., 2015) including teachers and teaching.

Leadership Functions Distributed in Schools

Numerous leadership researchers present frameworks related to leadership functions or responsibilities that the principal fulfils in the school (Lambert, 2002). These frameworks have also been used to describe the ways in which leadership distribution can be carried out (Hallinger & Heck, 2009, Leithwood et al., 2007). The school principal can fulfil these leadership roles by distributing or sharing the responsibilities among position holders or teachers with expertise or skills, so that the person included can become a part of the school-wide leadership team that jointly play out the leadership role.

Leithwood and his colleagues (2007) proposed four different leadership functions that are distributed in the school including setting school direction, developing people, redesigning organizational structure, and focusing on instructional practice.

Distributed leadership function: setting school direction

Former researchers have defined the dimension of vision, mission and goals for school. DuFour and Eaker (2010) argue that vision gives the organization a direction, while mission serves as an organization's purpose. Mission, vision and goals are considered the building block for creating a successful professional learning community with the explicit direction, purposes and goals. Lambert (2002) explain that a shared vision encompasses collective goals where the emphasis is to improve the student performances. School vision has also been characterized as an educational platform where the organization's beliefs create theme of the organization (Gordon, 2005).

The vision of the school is the direction for school to operate and develop. Distributed leadership increases dedication of teachers to the collective good and goal of the school. Leithwood and his colleagues (2007) conclude that those teachers who are frequently involved in setting the school vision and goals are more likely the people who understand the school and to respond to and enact those goals most promptly. One of the most important components of distributed leadership is that teachers are included in decision-making when planning the school goal, which Spillane and his colleagues (2007) argue to have significant impact on school instructional quality and climate. The team building approach is the basis of site-based decision making. There are four main beliefs regarding site-based decision making (Lunenburg & Ornstein, 2004). The first focus is to reply on teachers because they are spending time with the students. Second, teachers, parents, and school staff should have more ownership in their policies and programs. Third, the teachers should have a voice in the process of decision making process since they are the people to carry out the decisions. Finally, change will more likely occur when there is ownership among the staff and those responsible for the process.

Distributed leadership relies on a team of leaders in the decision-making process, as well as implementing school improvement changes.

Distributed leadership function: people development

As teachers have the knowledge and skills that are accumulated through the years of teaching, adopting distributive leadership in schools that have the teachers included in developing the other teachers would possibly benefit the school with better professional capacity and school outcomes (Marks & Printy, 2003). In a collective and sharing environment, teacher will be provided opportunity to set up the agenda for their own professional development as well as the procedures and content for the school-wide professional development programs. This is the opportunity for the teachers to exercise their intellect and skills, and become important part of leadership team developing the collective professional capacity in the school (Copland, 2003; Camburn et al., 2003; Leithwood et al., 2007; MacBeath, 2005; Storey, 2004; Timperley, 2005). Meanwhile, when teachers are included in the leader team, their own skills could also be developed through working with the principal, and their direct participation in school-wide professional development will provide them the sense of ownership and authority, both of which will help improve teacher motivations and capacities (Leithwood et al., 2007). Little (1990) suggested that professional connection between teachers facilitate school improvement and professional interaction lays the solid foundation for a positive collaborative environment in the school.

Distributed leadership function: redesigning the organization

Organizational structures may include communication strategies encompassing shared decision making and strategies for involving teachers in the decision making groups. From Leithwood et al. (2007), it is important to redesign the organization so that leadership

distribution could be applied in a routine basis towards a more planfully aligned order, which could benefit the school in a positive way. The purpose for redesigning the organization is to change school culture and structure by facilitating collaborative interaction for instructional improvement (Leithwood, 2006). Teachers need opportunity as well as an institutional structure and time to share their instructional capability and practices in order to develop people around them within schools (Harris & Muijs, 2005). The school need this blocked time and structured activities for these activities of shared decision making, sharing of professional resources, collective professional development being carried out. Moreover, redesigning school for leadership distribution is the process to create an environment of trust, respect and collaboration, which increase school social capital for stronger organizational capacity (Angelle, 2010; Dimmock, 2011).

Distributed leadership function: instructional program management

As an instructional leader, the principal's role includes developing and communicating an instructional vision, building trust, building collaborative climate, supporting teacher's professional development and supervising instruction (Hallinger & Murphy, 1985; Hargreaves & Fink, 2006; Spillane et al., 2001). The principal is dedicated to increasing the leadership capacity within the school in order to collaborate with each other and to consolidate resources in order to improve student achievement (Heck & Hallinger, 2009; Dimmock, 2011). Teachers are the most influential contributors to the success of their students (Rivkin, Hanushek, & Kain, 2005), and they have been more frequently involved in the instructional practice and decision-making process within the school for instruction (Leithwood et al., 2007). The instructional leadership function is the key function when adopting a distributed leadership in schools for success and teachers are inevitable the most important part for this function

(Camburn et al., 2003; Copland, 2003; Storey, 2004; Timperley, 2005).

Distributed leadership is particularly important under current accountability reform. Schools have to provide supervision and support towards instructional improvement and multiple leaders beyond the principal mobilize and support teachers for more effective instructional practice (Spillane et al., 2004). Leading instructional practice or being involved in the instructional decision making require teachers to have a voice in decision making about hiring, developing instructional staff, monitoring instruction quality and consolidating resources that foster instructional improvement (Leithwood et al., 2007). Teacher leaders like the department chairs or even the veteran teachers have a huge impact on the decision of school-based curriculum and content, instructional strategies and focuses, student management, and the improvement of collective instructional capability. (Harris & Muijs, 2005). Teacher leaders actually take considerable responsibilities for instructional leadership and accomplishment of instruction related tasks.

Distributed leadership and Teacher Quality

Distributed Leadership Increases School Capacity

The school's primary mission is to advance student's learning. The emphasis of building robust school leadership and helping recruit and maintain strong teachers now stands at the core of many reform efforts because teacher quality and school leadership are the leading factors proved by research to significantly impact learning outcomes (Chetty, 2012; Darling-Hammond, 2000; Goldhaber & Anthony, 2007). From Dimmock (2011), schools have organizational capacity which refers to the ability of schools to innovate and transform by better using of intellectual capital including knowledge, skills, values and dispositions of faculty and staff, and social capital like collegiality, trust, respect, and team work spirit in order to achieve most

possible school outcomes. School leadership is undeniably vital and essential to create and sustain elevated school performance because schools' organizational capacity is to a large extent determined by the leader's ability to leverage all the resources to lead and oversee the process of school success (Dimmock, 2011, Marks & Printy, 2003). One possible way for the leader to achieve amplified organizational capacity is to have indispensable knowledge, skills and strategies to individually plan and arrange for the effective and comprehensive use of all school intellectual and social capitals for the best outcomes; nevertheless, it is beyond every single leader's capacity to possess all related knowledge, skills and leverage methods in an everchanging school environment with rigorous and increasing accountability demands in order to achieve maximize organizational capacity (Gronn, 2008; Harris, 2005). Rather, leaders need to stimulate, develop and support the growth of intellectual and social capital as a whole in the school, in part by distributing leadership to qualified professionals in order to leverage strategies to improve teaching and learning (Dimmock, 2011, Leithwood et al., 2012). In the process of distributing school leadership, the teachers with knowledge, skills, and dispositions would be most likely involved in leadership team (Barth, 2001, Harris & Muijs, 2005, Lashway, 2006); their professional contribution help the leadership team supervise school teaching in different subject areas (Day, Gronn, & Salas, 2006); Moreover, the process of distributing and sharing of leadership responsibility will help improve trust levels between leaders and teachers (Angelle, 2010; Hopkins & Jackson, 2002), and build up a collaborative and collegial environment in the school (Bennett, Wise, Woods, & Harvey, 2003; Bolden, 2011). These interactions increase the school social capital and enhance organizational capacity. The distribution and sharing of leadership responsibility with teachers helps stimulate and develop teacher capacity by providing them with opportunity of learning new knowledge, skills and change their values for better

teacher quality.

Figure 6: A Conceptualization of Distributed Leadership as a Way of Building School

Capacity



Linking Distributed Leadership with Teaching and Learning

In reviewing recent leadership research, Printy (2010) noted twofolds about principal leadership that firstly, principal leadership is essential to student learning, but principals' impact on student learning is mediated and indirect by working with teachers who have the direct impact on student learning. Available research evidence supports that student achievement is better in schools where there exists a form of sharing for leadership responsibilities (Heck & Hallinger, 2009; Leithwood & Jantzi, 2012; Marks & Printy, 2003).

Harris, Hargreaves, and Fink (2008) stated that the form of effective leadership for improved outcome and positive learning environment is often shared or distributed in nature. Meantime, Hargreaves and Fink (2006) argued that leadership has to be distributed or shared among school staff for sustainability and effectiveness. These claims are consistent with a limited number of quantitative studies. Heck and Hallinger (2009), using a longitudinal data set and multi-level SEM, revealed a significant and direct correlation between distributed leadership and the positive school academic capacity, and a small but indirect effects on student math growth. This study is the one of the most important study to have demonstrated the direct impact of distributed leadership on school climate and the indirect but significant impact on student learning through changing the school capacity. Even earlier, Marks and Printy (2003) found a significant influence of transformational leadership coupled with shared instructional leadership on teaching pedagogy and student achievement. Their finding is also positive in terms of shared instructional leadership on school professional capacity and student achievement Leithwood and Jantzi (2012) investigated the impact of "collective leadership", which refers to the combined influence of different sources of people including the principal, assistant principals, teachers, and staff team. They found small but significantly indirect effects of collective leadership on student achievement, this effect is mediated through staff performance.

Teachers leaders have a better sense of school and ownership of the school, which leads to increased motivation, professionalism and commitment (Hulpia et al., 2012; Leithwood & Jantzi, 2012). In this perspective, when principals launch distributed leadership, the school strengthens academic capacity (Heck & Hallinger, 2009); and in turn promotes teacher's pedagogical skills (Marks & Printy, 2003) and knowledge (Leithwood & Jantzi, 2012). Increased participation in decision making within distributed leadership mechanism like setting school goals and redesigning school organization from more teachers will typically lead to increased commitment to institutional goals (Hulpia et al., 2012; Hulpia et al., 2009). Distributive Leadership practices strengthen the organizational culture and organizational

affiliation, which ultimately results in high teacher efficacy, increased trust, job satisfaction and teacher stability (Angelle, 2010), as well increased motivation to teacher (Leithwood & Jantzi, 2012). These conditions and dispositions, in turn, foster improved student achievement (Leithwood & Seashore-Louis, 2012; Marks & Printy, 2003) and instructional practices (Seashore Louis, Dretzke, & Wahlstrom, 2010)

Call for Quantitative Research Linking Distributed Leadership and Teacher Quality Directly

There has been a body of research linking distributed leadership with many school aspects including organizational culture (Angelle, 2010), organizational commitment (Hulpia et al., 2009, 2012), motivation and working setting (Leithwood & Jantzi, 2012), academic capacity (Heck & Hallinger, 2009) and academic optimism (Mascall et al., 2008). These studies are both qualitative and qualitative in nature, adding evidence for the promise of distributed leadership for school capacity (Dimmock, 2011). There are also a small set of quantitative researches linking distributed leadership with student outcomes (Heck & Hallinger, 2009), relating integrated shared instructional leadership to teacher pedagogical skills and student achievement (Marks & Printy, 2003), and connecting collective leadership with teacher knowledge (Leithwood & Jantzi, 2012).

But there is little research investigating the direct relation between the patterns of distributed leadership and comprehensive in-service teacher quality using quantitative measurement. The pattern of the distributed leadership here refers to how formal position holders and informal leaders participate in different leadership roles. The proposed research looks at how each of the five leadership functions is distributed among the people who have a hand in these responsibilities, and how much formal and informal leaders are actually involved

into this functions respectively. Further, leadership practice has to be explored for its contribution to promoting organizational capacity, specifically, teacher quality. The study intends to demonstrate the direct relation between how the leadership is distributed and the level of teacher quality.

Teacher Quality and Measurement

The Coleman report (1968) argued that teacher characteristic is the most important school factor that has positive impact on student achievement, especially for minority students. Since then, numerous researches have been investigating the relationship between school outcomes and specific teacher characteristic and found teacher quality is essential in predicting student outcomes (Darling-Hammond, 2000; Goe, 2007; Hanushek & Rivkin, 2006; Rivkin et al., 2005; Sanders & Rivers, 1996). Substantial differences remain across schools in the qualifications and quality of teachers in terms of helping student learning (Lankford, Loeb, & Wyckoff, 2002). Teacher quality has received sustained attention, but the measurement of teacher quality remains ambiguous. Researchers measure the quality of teachers with the focus on different characteristics of teaching as well as stages of teacher development (Darling-Hammond, 2000; Greenwald, Hedges, & Laine, 1996; Hanushek, 1997; Wayne & Youngs, 2003)

Goe (2007) undertook a review for the and categorized teacher quality in four indicators-teacher qualifications, teacher characteristics, teacher practices and teacher effectiveness. These are the primary variables explored for teacher quality in the research from 2000 to 2007. Kennedy (2008) also proposed three broad domains of teacher quality. "Personal resources" means those qualities that teachers have even before they enter the field like their credentials, degrees, and certificates etc. "Performance," for Kennedy, referred to the work

teachers actually do in their daily practice. Finally "effectiveness" usually means how good teachers are at helping student learn in terms of standardized test scores. Strong (2011) in his book listed teacher qualification, teacher attributes, pedagogical skills and practice, and teacher effectiveness which are measured through rubrics to identify and predict teacher quality. He reviewed the former research and argued that current policy equates teachers who have the right kinds of established qualification, such as credentials and experience, with the provision of high-quality instruction. He suggests that teachers who have certain psychological, personal and teaching attributes might be more effective in the school. Other researchers in his review think of teacher quality solely in terms of classroom practices and rate the capacity of effective or successful teaching as measured by student test scores. These three taxonomies are compatible with each other holding a holistic perspective towards teacher quality, with the following indicators:

<u>Teacher qualifications</u>: these include teachers' credentials, as well as knowledge and experiences before the teacher starts to teach and the continually obtained capability or credentials.

<u>Teacher characteristics</u>: these are the attitudes and attributes for individual teacher, for example: their natural features like race, gender and background, their expectations for students, their collegiality or a collaborative nature

<u>Teacher pedagogical practices</u>: this is the direct demonstration of how teachers use their skills and knowledge to conduct instructional practices in the classroom including pedagogical skills, belief, classroom management, instructional strategies for teaching goals and interaction with students

Teacher effectiveness: Teachers' ability in helping students learn. A "value-added"

assessment has been argued as the indicator to gauge how much teacher's individual work in the classroom contributes exclusively to their students' learning after controlling for other school and family factors.

Measurement of Teacher Quality in Schools

Some research has confirmed that teachers who graduate from competitive college and hold higher test scores may be more effective in teaching (Clotfelter, Ladd, & Vigdor, 2007; Ferguson & Brown, 2000; Wayne & Youngs, 2003). Other related variables include teacher's advanced degree, pedagogical content knowledge, engagement of professional development, teaching experience, and effectiveness as measured by student achievement (Strong, 2011; Stronge, 2007). Though there isn't consensus towards which indicator works best for predicting teacher quality (Wayne & Youngs, 2003), these variables have been proved by some research to have positive impact on student learning (Greenwald et al., 1996).

A large amount of research attempts to explain teaching effects on students' performance, much in the field of mathematics education. Teachers with advanced degrees achieve greater gains in student learning (Berry, Hoke, & Hirsch, 2004; Goldhaber & Brewer, 1996). Others studies show positive gain when mathematics teachers have stronger math content knowledge (Berry et al., 2004; Hill, Rowan, & Ball, 2005).

Other credentials, such as National Board Certification, appear to make a positive difference in both mathematic achievement (5% standard deviation) and reading achievement (4% standard deviation) (Goldhaber & Anthony, 2007) and for elementary teachers generally. Within this realm of research, many studies show positive effects of specific types of professional development, such as job-embedded PD and in high poverty schools (Kannapel, Clements, Taylor, & Hibpshman, 2005; Wenglinsky, 2000).

Studies of teaching experience are perhaps the most predominant in teacher quality research in predicting student achievement. Hanushek and Rivkin (2006) reviewed research and found a positive relationship between teacher experience in terms of service length and student achievement though the effect size is small; on average, teacher quality improves in first five years after teachers take the job then plateaus for the rest of their career. Finally, some researchers contend that standardized test scores are a better indicator of teacher quality than other indicators (Hanushek & Rivkin, 2006).

In addition to teachers' degree and experience that lay in the category of teacher qualification, the key indicator of teacher quality is teacher's instructional practice or teacher effectiveness

Conceptual Framework for Teacher Quality

Researchers have been proactive in developing a conceptual framework with the hope to capture the key features of effective teachers and teaching. As mentioned above, Goe (2007) concluded four key categories of effective teachers that fundamentally shields the important elements for measuring teacher quality using the criteria spreading the whole process of teacher preparation, teaching and outcomes. More specifically, Stronge (2007) conducted a review of available research and built a framework using research-based qualities of teacher quality. This framework includes 6 domains as following:

- 1. Prerequisites for Effective Teaching (language capability, content knowledge, pedagogical knowledge, certification status, and teaching experience),
- 2. The Teacher as a Person (fairness and respect for their students, caring of the work and students, enthusiasm, motivation, dedication to teaching, appropriate interactions with students, and reflective practice),

- Classroom Management and Organization (organization of classroom actives, student management and discipline of students),
- 4. Planning for Instruction (content selection, time allocation, expectations for students and classes, and instructional plans)
- 5. Implementing Instruction (instructional strategies, questioning, and student engagement),
- 6. Monitoring Student Progress (assignments and homework, supervising student progress, and responding to student needs and abilities)

Danielson (2013), among the most influential scholars, also developed a wildly used framework for teachers' effective instructional practice, with the consideration of the complexity of teaching and the expectation to develop and guide teachers for more effective instruction. Danielson's framework is consisted of four broad domains with 22 qualities of effective teachers. These four domains include

- 1. Planning and Preparation
 - 1) demonstrating knowledge of content
 - 2) demonstrating knowledge of resources
 - 3) demonstrating knowledge of students
 - 4) setting instructional goals
 - 5) designing coherent and effective instruction
 - 6) monitoring and assessing student learning
- 2. Classroom management
 - 7) Creating a classroom environment with respect and rapport
 - 8) Establishing a culture for desired learning,

- 9) Managing classroom
- 10) Supervising and guiding student behaviors
- 11) Organizing physical space
- 3. Instructional practice
 - 12) Communicating the learning content clearly and accurately
 - 13) Using questioning and discussion techniques
 - 14) Engaging students in learning
 - 15) Providing feedback for student process and learning
 - 16) Demonstrating flexibility and responsiveness for student learning activities
- 4. Professional Responsibilities
 - 17) Reflecting on instruction
 - 18) Maintaining accurate records of individual students and teaching process
 - 19) Communicating effectively with families
 - 20) Contributing to the school and district
 - 21) Growing and developing professionally
 - 22) Showing professionalism

These four domains with 22 sub skills regarding teaching, classroom management, professional development, and instructional practice depicts a picture of what are key components for being an effective teacher, which provides the teacher preparation institutions to train the teachers and also provides the criteria standards for the teachers to mirror their own teaching and improve through key element of reflecting on instruction.

The preceding frameworks mentioned above are not exactly identical in structure and content, though there is considerable content overlap. This demonstrates a fact that some of the

essential characteristics of effective teachers are common in many different circumstances like knowledge, the ability to manage the classroom, the pedagogical and instructional skills, the enthusiasm for teaching and students, student engagement and interaction and the capability of continuous learning.

Figure 7: Teaching Quality Framework



The frameworks discussed above by Danielson (2013) and Stronge (2007) undergird this study, the research review depicts the fact that the quality of effective teachers is a comprehensive aspect. The domains of qualities including prerequisite qualification such as degree, experience and certificate; the teachers' attribute including their belief and efficacy for teaching, the teaching practice that focuses specifically on the aspects relating to classroom management and organization, engaging students in leaning, implementing instruction, interaction and relationship with students and their understanding and practice of constructivism in the class to scaffolding student learning. The last reflection of teaching quality is also the teachers' impact on student learning, namely, the student achievement as represented by their test scores. The focus for this study is the teacher's teaching practice, the teachers' prerequisite

qualification and their belief.

Conclusion

There has been enthusiasm for both researchers and practitioners to delve into the emergent concept of distributed leadership, and the implementation of leadership distribution in the school (Bennett et al., 2004; Wood et al., 2004). Former researchers have framed various theoretical conceptualization of distributed leadership and argued the importance of involvement from both formal and informal leaders towards leadership responsibility under certain social contexts (Gronn, 2002, Leithwood et al., 2007; Spillane et al., 2007). But the statistical evidence of how specifically the leadership is distributed in terms of each leadership function has not yet been fully investigated and depicted, especially on who are involved in the leadership roles, and how leaders' collaboration happens based on the involvement patterns from both formal and informal and informal leaders to fill a gap by explicitly depicting the extent of participation from both formal and informal leaders for each leadership roles.

In a distributed leadership model, school leaders work to develop a more collegial environment with shared leadership towards a common goal (Hargreaves et al., 2012, Dimock, 2011), which might be beneficial for teacher learning and development. The research studies reviewed have investigated the link between distributed leadership and organizational culture, academic capacity, teacher career optimism, motivation, pedagogical skills, and student test scores, but there is no empirical evidence on how each of the leadership function is carried out by multiple people and how the different pattern would be related to comprehensive teacher quality improvement. Based on the existent evidence, I hypothesize that the higher level of informal leader's involvement would benefit overall teacher-quality improvement, which need direct evidence from rigorous quantitative study for the causal relationship.

CHAPTER 3: RESEACH DESIGN AND METHODOLOGY

Brief Review of the Research Design

Chapter three presents the instruments, variables, measurements, and analytical techniques used to answer each of the research questions. Examining the Teaching and Learning International Survey (TALIS) 2013 data, this study is a cross-sectional secondary analysis to explore the pattern of involvement by two-level leadership groups in the five leadership functions, and the existence of relationship between the pattern of distributed leadership and teaching. This research adopted quantitative method to measure the extent of involvement by formal leaders and informal leaders into each of the five leadership roles. Firstly, I present information about the TALIS 2013 data and its sampling strategy. Next, I discuss the specific variables from the TALIS 2013 that I used to construct the latent measurements of distributed leadership and the teaching quality. Finally, I take up each research question in turn and present the analytic methods I used to answer each question.

Secondary Data- the Teaching and Learning International Survey (TALIS) Introduction of 2013 TALIS Study

This study used the 2012-2013 administration of Teaching and Learning International Survey (TALIS) developed by the Organization for Economic Co-operation and Development (OECD). TALIS is the first non-experimental, cross-national survey that provides policyrelevant data concerning the working conditions and climate of both the principal and teachers in schools. It offers the policy makers, administrator to learn through the first-hand data about school contexts and people attitude as well as some of the practice in the system. These information provides the opportunity to deepen analysis of the issues regarding leadership, professional community, job condition and satisfaction (OECD, 2014).

The first cycle of TALIS was conducted in 2008 with 24 countries, the TALIS 2013 participants included 34 countries and regions with 32 countries having the data public (OECD, 2014). TALIS conducted two separate collection of data from one principal and the teachers within the same school. TALIS required all participating countries to have the "core" survey at Level 2 that is the lower secondary level of education of the International Standard Classification of Education (as cited from OECD, 2014). This research used "core" survey at level 2 for analysis.

The questions creation for 2013 TALIS was driven by theory with intensive consultation from the expert both in the area and research design to guide the selection and structure. The development of the conceptual framework also involved maximum input from each individual country for the contextual fitness and implementation of the study (OECE, 2014).

The TALIS 2013study include the following themes and key components in the questionnaires:

- school leadership;
- teacher training and in-service professional development/initial teacher education;
- teacher appraisal and feedback;
- school climate and ethos;
- teachers' pedagogical beliefs;
- teachers' pedagogical practices;

For the interest of this study, the items in the principal survey regarding leadership roles and teacher appraisal; and teachers' pedagogical beliefs and practices in teachers' survey were included in the inquiry.

TALIS Sampling and Weight

As indicated earlier, TALIS 2013 surveyed the ISCED Level 2 (Lower secondary) as "core" so most country have data at this level, but some other countries also have the surveys implemented at ISCED Level 1(Primary), ISCED Level 3 (Upper Secondary) and the TALIS-PISA Link. All 34 participating countries have data for ISCED Level 2 core, 6 countries or regions have ISCED Level 1, and 10 participants have ISCED Level 3 data. Eight participating countries have schools that participated in PISA study so these schools are called PISA_TALIS link schools. Please refer to APPENDIX A for the details of participating countries at each level. The study will only apply data at ISCED Level 2 (Lower secondary level).

The sampling plan for the TALIS 2013 was a stratified two-stage cluster sampling design (OECD, 2014). The first stage was to draw primary sampling unit (school) using systematic random sampling with probability proportional to size for each participating country, then the selected schools provided TALIS management team with all eligible teachers teaching at specific level (ISCED Level 2 primarily). TALIS management team drew a random sample of teachers as the second sampling unit. On average, 200 schools and 20 ISCED Level 2 teachers per school were surveyed in each participating country. Please be aware that only ordinary schools were selected for the study. Please refer to APPENDIX B for the sample size of both school and principal levels that participated in the core survey with the explicit stratification methods and the numbers of the sampling. The countries that have 75% schools and teachers finished the study would be consider as reliable (OECD, 2014).

OECD (2014) in the TALIS technical report stated that due to the complex stratified sampling method, there is necessity to apply weight for a more accurate estimate doing any analyses. OECD provided two sample weight index in the dataset for each country, which is the

result of the combined adjustment for both selection and response stages for both the teacher survey and the principal survey. Because there were countries that either failed to participate if being selected or failed to response, OECD recommended to adjust the estimate using the sample weight that will help reduce the sampling error.

Independent Measures: Constructing Latent Variables for Distributed Leadership

Using the TALIS 2013 data, this study intends to first measure, in an international context, who are involved to support the principal to fulfill each of the leadership functions; and how the formal leaders (the principal and the management team), and informal leaders (the governing board, the mentors and the teachers) are simultaneously or exclusively involved into each of the five leadership functions.

Because distributed leadership, especially how the leadership is distributed for each of the school functions, was not a primary focus of the TALIS 2013 study, constructing the measurement of the extent of the involvement by formal and informal leaders for each of the five leadership roles was of paramount step for this study. If the constructs were to measure what they purported to measure, they needed to meet three requirements: (a) to include the appropriate groups of people in the school leadership team both formally and informally, (b) to reflect the conceptual basis for each of the five leadership functions that were distributed in the school, (c) as composite measures, to be internally consistent or reliable and to avoid multicollinearity. The following section describes how each of the constructs meets these tests.

The five leadership domains that guide the construction of the distributed leadership measures are setting the direction, developing people, hiring and setting salaries, and managing the instruction (Leithwood et al., 2007). But before constructing the measure for the leadership functions, it is paramount to identify who are included into the leadership roles as formal or

informal as identified in the TALIS study.

The Classification of Formal and Informal Leadership Team

TALIS was designed to investigate the involvement of different level of personnel into leadership roles, but the configuration was not consistent across the questions asked. I went through all the questions first and identified all the school configurations that were included into the survey, which are the principal, the management team, the federal, state and local authority, the mentors, the teachers, and the governing board. This research would permit me to cluster different school levels of personnel into two categories as Formal leaders and Informal Leaders. The principal, the federal, state and local authority were identified as formal leaders as these are obviously position holders that Leithwood et al. (2007) considered as the "leader of the leaders"; the teachers and the mentors were included into the informal leader group as Leithwood et al. (2007), Spillane (2006) and Harris and Muijs (2005) all articulated that the teacher leaders, though without positions in some circumstances, would still play essential role in leading the school. The researcher need to identify which category the management team and the governing board would fit as these were a group of people and the composition for these teams remained unclear.

In the TALIS 2013 data, there were two questions (TC2G17, TCAG24) asked specifically about who were represented in the management team and governing board (1=Yes, and 2=No). To reach a reliable decision of classifying these two groups into appropriate category, I did a descriptive analysis using TALIS 2013 BCGINTT2 data (ISCED level 2 with all countries) for question TC2G17 (management team) and TCAG24 (governing board), and found out that though teachers (\bar{x} =1.47) are moderately involved into the management team, the principal (\bar{x} =1.01) and assistant principal (\bar{x} =1.20) represent most in the management team so management team was identified as Formal Leaders. On the other land, the answers revealed governing board is mostly consisted of teachers (\bar{x} =1.17) and parents (\bar{x} =1.12). Consequently, governing board is classified as Informal Leaders in this study.

Identifying Leadership Functions that were Included in the TALIS 2013

Because distributed leadership was not a primary focus of the TALIS study, construct validity in the measurement of leadership function that are distributed among different school leaders was of paramount concern. The literature review in chapter two demonstrated that there are some important supportive and supervisory school leadership functions (Hulpia & Devos, 2010) and responsibility as setting the school direction, developing people, dealing with human resources, and supervising instructional practice (Leithwood et al., 2007). To measure the involvement of different people into schools leadership role, it is important to first identify what leadership responsibilities were included into TALIS 2013 survey.

TALIS study administered two questionnaires to respondents in each participating country: a school questionnaire to the principals, and a teacher questionnaire to the teachers. For the school questionnaire, there are key areas of emphasis as well as some background information for both the school and the principal. The explicit categories and the variables included in TALIS 2013 principal survey are listed in Table 2.

| Category | Variable | Numbers of Items |
|------------|--------------------------------------|---------------------|
| Principal | Gender | 1 |
| Background | Age | 1 |
| | Education | 1 |
| | Experience | 5 |
| | Employment status | 1 |
| | Training | 3 |
| | Professional Development | 6 |
| | Barriers to Professional Development | 7 |

Table 2: Category and Variable Distribution of the TALIS 2013 Principal Questionnaire

Table 2 (cont'd)

| School Background | Location | 1 |
|-------------------|--|-------|
| | Public/Private | 1 |
| | School Funding | 2 |
| | Staffing | 5 |
| | ISCED Level | 10 |
| | School Size | 1 |
| | SES | 3 |
| School Leadership | Management team and composition | 10 |
| | Significant Responsibility*** | 11x5* |
| | Principal's time spent on particular tasks | 6 |
| | Principal's Engagement into particular tasks | 11 |
| | Decision Making and Involvement of teacher, | 5 |
| | parent and students | |
| | Governing board | 10 |
| | Workshop for parents | 5 |
| | Restriction for leadership effectiveness | 9 |
| Teacher Appraisal | Who performed teacher appraisal? | 5 |
| and Feedback | Tasks as part of teacher appraisal | 6x6** |
| | Tasks following an appraisal | 8 |
| School Climate | Collaboration, sharing, and mutual respect | 6 |
| | Shortage of resources | 9 |
| | School delinquency and violence | 11 |
| Teacher Induction | Induction Program offered in the school | 3 |
| and Mentoring | Who are offered induction? | 1 |
| | Induction Structure and Activity | 9 |
| | Access to Mentoring | 1 |
| | Subject Matching of Mentor | 1 |
| | Importance of Mentoring | 6 |
| Job Satisfaction | General Feeling of the job | 9 |

* Each question is asked with the expected involvement of different level of school personnel including the principal, the management team, the teacher, the authority and the governing board ** Each question is asked with the involvement of different level of school personnel in teacher appraisal tasks including the external individual, the principal, the management team, the assigned mentor, the teacher, or not happened in the school.

*** Bold and Italic Variables are included into measurement of leadership distribution for particular responsibilities

As mentioned above, the TALIS included a wide range of questions that explored a

broad base of school related manifestations. As distributed leadership is the paramount concern

of this study, I only included variables that emphasize leadership functions in this study. These

variables are "Significant Responsibility" (TC2G18); and "Tasks as part of appraisal"

(*TC2G28*). As these questions were designed to explore perception of the principal on the varying degrees of participation into each of the leadership responsibilities by the principal, the management team, the authority, the governing board, the teacher and the mentor. To make the decision of tagging the questions to be included into each leadership function, an Exploratory Factor Analysis was applied to testify how the survey questions would form different factors for different leadership functions that verified the theory.

Exploratory Factor Analysis for Leadership Functions

Factor analysis is a multivariate statistical approach commonly used in social science, the main goal of Exploratory Factor Analysis is to determine the minimum number of common factors required to adequately reproduce the item correlation matrix (Field, 2005; Williams, Brown, & Onsman, 2012). Researchers need to determine the number of factors extracted using eigenvalues calculated from input correlation matrix. As a rule of thumb, count the number of eigenvalues greater than 1 and use it as the number of factors (Brown, 2015; Field, 2005; Williams et al., 2012). In the exploratory factor analysis, factors are constrained to be uncorrelated in orthogonal rotation but not necessarily in oblique rotation. Varimax (orthogonal) and promax (oblique) rotations are commonly used (Field, 2005). As to the missing data, there are three options offered in Stata when running an exploratory factor analysis. Listwise will omit the respondent from all the data analysis if the respondent has any missing value for any variable. Pairwise is not as harsh as listwise in that the respondent is dropped only on analyses involving variables that have missing values. The third method is to replace the missing value with mean (Brown, 2006).

According to Field (2005), much has been written about the necessary sample size for factor analysis resulting in many 'rules-of-thumb, Field himself, for example, states that a

researcher should have "at least 10-15 subjects per variable" (p. 443). Habing (2003), states that "you should have at least 50 observations and at least 5 times as many observations as variables" (p. 3). Monte Carlo studies have resulted in more specific statements concerning sample size (Field 2005, p. 443). The general conclusion of these studies was that "the most important factors in determining reliable factor solutions was the absolute sample size and the absolute magnitude of factor loadings" (Field 2005), the more frequent and higher the loadings are on a factor, the smaller the sample can be. The sample size for this study for school level is 6455 in total so it is not a problem running an exploratory factor analysis.

Leadership functions to be distributed among multi levels

This study used principal factor method that is the most commonly used approach and computes without regard to any underlying structure caused by latent variables; components are calculated using all of the variance of the manifest variables, and all of that variance appears in the solution (Field, 2005). Promax was used in the EFA for this study as these factors of leadership functions would be correlated. And 'exclude cases listwise' was adopted for dealing with missing data as the sample size is large enough even if omitting the respondents if any of the variable had missing values.

The EFA yielded 19 factors for the variables included using the principal component extraction and promax rotation with the Eigenvalue greater than 1 rule (Field, 2005). The factor model explained approximately 59% of the total variance. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.885 which falls into the range of being great, so, the factor analysis is appropriate for these data (Field, 2005). Bartlett's test is highly significant (p < 0.001), and therefore factor analysis is appropriate (Brown, 2006; Field, 2005).

The EFA result was quite compatible with the theoretical framework reviewed in chapter

two that principals in the school play supportive and supervisory roles (Hulpia & Devos, 2010) setting school direction (Hallinger & Murphy, 1985; Leithwood et al., 2007), supervising, inspiring and promoting individual development (Leithwood & Seashore-Louis, 2012), creating an organizational structure for effective teaching and learning (Leithwood et al., 2007), supervising and supporting for high-quality instructional delivery (Hallinger & Murphy, 1985; Leithwood et al., 2007). These theories guided the exploratory factor analysis and the final classification of the factors and indicators for this study.

Figure 8: Leadership Functions Distributed in the School



One key issue to be addressed here is the factor loading for sub question 5 (asking whether the local, state and federal authority participated in each leadership roles) of each item in TC2G18 question set, which emphasizes the leadership responsibility to be distributed, is negative in EFA factor matrix. This aroused the issue to include local, state and federal authority into the formal leadership team, because the loadings of the item were opposite to that of the principals and the management teams. In addition, the question TC2G28 set included external individuals (sub-question 1of each item) into the inquiry on whether these people were involved in providing praise for teachers. These people could hardly be identified as position holders outside of schools like official identified in TC2G18 question set, or the parents and community involvers. Based on the EFA factor scores, I decided to not include "local, state and federal authority" (sub-question 5 of each item) from question TC2G18 set, and "external individuals" (sub-question 1 for each item) from TC2G28 set into the final analysis.

Coding of the Items, Internal Consistency and Multicollinearity Test

Table 3 outlines the survey items that have been extracted for analysis. The items in TT2G18 question set contains a group of questions probing who in the schools are responsible for the specific school functions, including deciding the salary, hiring, deciding the content and courses offered in the school, making decision of student discipline, admission and assessment. Each of the questions has five sub-questions that have Yes (1) or No (2) responses to indicate whether these five groups participate in leadership as principal; other members of the school management team; teachers (not as a part of the school management team); school governing board and (Local, municipality/regional, state, or national/ federal) Authority. So for each question like TC2G18A, 'who has the responsibility of appointing or hiring teachers?' there are five sub-questions as TC2G18A1 to TC2G18A5 respectively answering whether each of the five groups participated in appointing or hiring. The sub-questions of all included items were categorized into one of the five leadership functions for each of the four leader groups based on the EFA results.

TC2G28 consists of the questions regarding who is taking the lead of helping develop people in the school through a variety of activities. Similar as TC2G18 set, each question of TC2G28 set has six dummy type of sub-enquiries with answer of Yes (1) or No (2) on who participate in observing class, discussing with the teacher and providing feedback, as external individuals, the principal, the management team, the assigned mentors, and other teachers (not a part of the management team), or not applied in this school. Sub question number six (not applied in this school) was not included in this study because it did not provide the information useful for this study. The sub-question 1 set (external individuals) had accepted loadings but I

could not identify whether these people are position holders or not, so I also dropped these subcategory for the final analysis. TC2G22 set contains questions on whether school staff, parent, student or the principal were involved in the school decision making respectively. Questions TC2G 22B (parents) and TC2G22C (students) were combined as governing board for this study. These questions in TC2G22 set have four scale Likert answers as strongly disagree (1), disagree (2), agree (3), and strongly agree (4). Due to the inconsistence of the question types in three question sets included, this study will standardize all the measurement (M=0, SD=1) for the comparative purpose.

After classifying the factors into each leadership functions respectively for the formal leaders and the informal leaders with the responding variables. The researcher used Stata 14 to check the correlation among the items under each latent variable, and there is no multicollinearity issue because none of the correlation is bigger than 0.8 (Gall, Gall, & Borg, 2003), and none of the VIP is larger than 10 (Gall, Gall, & Borg, 2003) which is to confirm that there is no multicollinearity issue for a set of variables to construct a latent variable. I also calculated Cronbach's alpha (coefficient of reliability or consistency) and correlation for each factor, and also for each group as formal and informal leaders that participate into leadership functions respectively. Cronbach's alpha test is a function of the number of test items and the average inter-correlation among the items (Creswell, 2003). The alpha for most factors are larger than or close to 0.7 that is a good sign of internal consistency of the construct (Creswell, 2003). The Cronbach's alpha test is a very important way to verify the inner-consistency of the items used to measure a specific variable, in simple words, it tells the extent the items include to tell the same story of the interest.

| Leadershi | Leader | Team Mombor | Survey Questions | International | |
|--------------------------|-----------|----------------|--------------------------------|---------------|-------|
| р Functions | Itain | wiember | Cronbach ² alpha | | pha |
| | | | | Factor | Group |
| Setting | Formal | Principal | TC2G22D | ^ | |
| School | Informal | Governing | TC2G22C, TC2G22B, TC2G22A | 0.713 | 0 733 |
| Direction | Direction | | | | 0.755 |
| | | Teachers | | | |
| Managing Formal | | Principal | TC2G18F1, TC2G18G1, TC2G18H1, | 0.801 | |
| Instruction | | | TC2G18I1, TC2G18J1, TC2G18K1 | | 0.852 |
| | | Manageme | TC2G18F2, TC2G18G2, TC2G18H2, | 0.834 | 0.052 |
| | | nt Team | TC2G18I2, TC2G18J2, TC2G18K2 * | | |
| | Informal | Teachers | TC2G18F3, TC2G18G3, TC2G18H3, | 0.636 | 0.735 |
| | | | TC2G18I3, | | |
| | | | TC2G18J3, TC2G18K3 | | |
| | | Governing | TC2G18F4, TC2G18G4, TC2G18H4, | 0.708 | |
| | | Board | TC2G18I4, TC2G18J4, TC2G18K4 | | |
| Hiring | Formal | Principal | TC2G18A1, TC2G18B1 | 0.844 | _ |
| | | Manageme | TC2G18A2,TC2G18B2, | 0.695 | 0.718 |
| | | nt Team | | | |
| | Informal | Governing | TC2G18A4,TC2G18B4 | 0.790 | |
| | | Board | | | 0.575 |
| | | Teacher | TC2G18A3, TC2G18B3 | 0.708 | |
| Setting Formal Salary | | Principal | TC2G18C1, TC2G18D1 | 0.831 | 0.811 |
| Scales | | Manageme | TC2G18C2, TC2G18D2 | 0.862 | |
| | | nt Team | | | |
| | Informal | Governi | TC2G18C4, TC2G18D4 | 0.766 | 0.671 |
| | | ng Board | | | |
| | | Teacher | TC2G18C3, TC2G18D3 | 0.767 | |
| Developin | Formal | Principal | TC2G28A2, TC2G28B2, TC2G28C2, | 0.727 | 0.776 |
| g People | | - | TC2G28D2, TC2G28E2, TC2G28F2 | | |
| | | Manageme | TC2G28A3, TC2G28B3, TC2G28C3, | 0.732 | |
| | | nt Team | TC2G28D3, TC2G28E3, TC2G28F3 | | |
| | Informal | Assigned | TC2G28A4, TC2G28B4, TC2G28C4, | 0.815 | 0.675 |
| | | Mentors | TC2G28D4, TC2G28E4, TC2G28F4 | | |
| | | Other | TC2G28A5, TC2G28B5, TC2G28B5, | 0.794 | |
| | | teachers | TC2G28D5, TC2G28E5, TC2G28F5 | | |

Table 3: Coding and Cronbach's Alpha for Latent Variables of Distributed Leadership

*The items with same alphabet letter but different number are the same questions asked for the participation from different groups

Dependent Measures: Constructing Latent Variable for Teaching Quality

The very important question to answer in this study is the correlation between the pattern of the distributed leadership and teacher quality. As discussed in chapter two, the measurement for teacher quality remains ambiguous among available literature. Researchers measure the quality of teachers with the focus on different characteristics of teaching as well as stages of teacher development (Darling-Hammond, 2000).

This research is to identify and measure in-service teacher cross-sectional pedagogical belief and practice included in TALIS 2013 teacher survey (OECD, 2014). In current educational practice, the fast spreading methods for assessing teacher performance are classroom observations, and test-based measures of student learning (value-added student scores) (Ferguson & Danielson, 2014). The test-based measures can help us better understand how much teacher's work add on students' learning. However, they do not indicate what teachers actually do in their classrooms, and which aspects of teaching may need to improve in order to effectively help student learn. In addition, there is severe concern of the technical issue in providing fair evaluation using value-added student scores, as it is extremely difficult to control all the student and school background to reduce teacher-student sorting bias towards evaluating teachers (Rothstein, 2009). In this study, the measurement of teacher quality will focus on what teachers do in their classrooms and how their cross-sectional instructional belief, knowledge and capacity are constructed beyond their prerequisite qualification including degree, experience and certificate status. Several frameworks done by Danielson, (2013) and Stronge (2007) about teacher quality were synthesized in this study to provide a comprehensive framework as a mean to promote clear and meaningful conversations about effective teaching practice. The synthesized framework is to measure teacher quality in terms of

- Prerequisite qualification including degree, experience and certificate,
- Classroom Management and Organization,
- Implementing Instruction,
- Engaging Student in Learning
- Interaction and relationship with students
- Constructivist beliefs

Identifying Teaching Quality Variables from TALIS 2013 Teacher Questionnaire

As mentioned above, OECD administered two surveys in 2013 TALIS study, one was for the administrator to explore school background, school leadership and management condition, and overall principal job satisfaction. The other was for the teachers in the same school to explore their background, professional development and teachers' pedagogical belief and skills (OECD, 2014). Teacher survey was used to measure teacher quality in this study. In order to extract variables that match the theory and can answer the questions of interests, the researcher went through all the questions in teacher survey first and identified all the questions that are related to teacher pedagogical practice and belief. Table 3.11 demonstrates the details of the variables in TALIS 2013, the items in bold and italic are those relevant to the interest of this research.

After reviewing and sorting the questions of TALIS teacher questionnaire, I included "Teaching Belief (Constructivism)"; "Teacher Collaboration"; "Pedagogical Skills and Practice"; "Class Management"; "Teaching Activities and Individual Consideration"; "Assessing Student Learning"; 'Teacher-student Relationship' into the investigation of teacher quality.
| Category | Variable | Numbers of |
|------------------|---|------------|
| | | Items |
| Teacher | Gender | 1 |
| Background | Age | 1 |
| | Employment status | 2 |
| | Reason as Part-time teacher | 1 |
| | Experience | 4 |
| | Whether teaching at other school | 2 |
| | Percentage of special need students | 1 |
| | Education | 1 |
| | Teacher training background | 4 |
| | Teacher Preparation Content | 3 |
| | Teacher Preparation Subjects | 8x4+1* |
| | Subject Teaching | 12 |
| | Work load | 2 |
| | Allocation of working hours | 9 |
| Professional | Professional Development Programs Participated | 3 |
| Development | Involving in Mentoring Activities | 2 |
| - | Professional Development Activities Participation | 14 |
| | and Duration | |
| | Professional Development Activities and | 28 |
| | Participation | |
| | Personal Payment for Professional Development | 1 |
| | Support Received for Professional Development | 3 |
| | Included in Designing Professional Development | 4 |
| | Professional Development Needs | 14 |
| | Barriers to Professional Development | 7 |
| Teacher Feedback | Methods to Provide Feedback | 6X6=36*** |
| | Emphasis Placed on Teacher Feedback | 11 |
| | Teacher Feedback has Led to a Positive Change in | 14 |
| | Teacher Perception towards Teacher Feedback | 8 |
| Teaching in | Teaching Belief (Constructivism)** | 4 |
| General | Teacher Collaboration | 8 |
| | Pedagogical Skills | 12 |
| Student | Student Composition (Special Need, Low SES, | 6 |
| Composition and | Gifted) | |
| School Condition | Shortage of Resources | 9 |
| | School Delinquency and Violence | 11 |
| Pedagogical | Teaching Subject | 3 |
| Practice | Class Size | 1 |
| | Teaching time allocation | 3 |
| | Class Management | 4 |
| | Teaching Activities and Individual Consideration | 8 |

Table 4: Category and Variable Distribution of TALIS Teacher Questionnaire

Table 4 (cont'd)

| | Assessing Student Learning | 6 |
|------------------|--------------------------------------|----|
| School Climate | Participation in Decision Making | 5 |
| | Teacher-student Relationship | 4 |
| | Teacher Job Satisfaction | 10 |
| Teacher Mobility | Been Abroad for Professional Purpose | 6 |
| | Purpose of Visit Abroad | 7 |

*8 subjects at 4 different school levels

** Bold and Italic Variables are included into measurement of teacher quality ***each question is asked with the involvement of different level of school personnel in providing feedback including the external individual, the principal, the management team, the assigned mentor, the teacher, or not happened in the school.

The questions were designed to explore perceptions of the teachers for teachers'

pedagogical belief and skills (TT2G32, TT2G34, TT2G42, TT2G43 "Teaching Belief

(Constructivism)", "Teacher Collaboration"; "Pedagogical Skills and Classroom

Management"; "Class Management"; "Teaching Activities and Individual Consideration";

"Assessing Student Learning"), as well as the relationship between teachers and students

(TT2G45: Teacher-student Relationship). An Exploratory Factor Analysis was applied to testify

how the survey questions would form reliable factors for measuring different aspects of teacher

quality framed by the theories (Danielson, 2013; Stronge, 2007).

Exploratory Factor Analysis for Teaching Quality

The sample size for the teacher questionnaire database is 104358 in total. The KMO value is 0.917, which is great to prove adequate data. The Bartlett's test is significant (P<0.0001), so the factor analysis is appropriate for these data. The EFA of teacher quality also used principal factor method with Promax rotation and excluded cases listwise for dealing with missing data. EFA extracted 5 factors with the Eigenvalue greater than 1 rule (Field, 2005). The factor model explained approximately 62.88% of the variance that is appropriate. (Field, 2005). The tapping of the factors was created to be compatible with the theoretical and conceptual framework proposed in chapter two.

Internal Consistency and Multicollinearity Test

The extracted factors and the items are listed in Table 5 that outlined the survey items that have been extracted to be responding to research questions based on EFA loading (Appendix D). The correlation matrix among the variables did not reveal any multicollinearity issue as none of the correlation was bigger than 0.8 (Cortina, 1993), and none of the VIP is larger than 10, which is the rule of the thumb to demonstrate satisfied multicollinearity test for the variables in this dataset. I also calculated Cronbach's alpha (coefficient of reliability or consistency) for each factor. The alpha for most factors are larger than or very close 0.7 that is a good sign of internal consistency (Creswell, 2003).

Coding and internal reliability

The component items for the teacher quality measures all come from the teacher survey as Likert type of question. The questions from TT2G34A to TT2G34I are the questions exploring the teacher's perception of how often they could adopt some actions regarding the instructional practice and classroom management that have four scales as well. Questions TT2G32A-TT2G32D are four questions asking about teachers' constructivist belief with four scale Likert type answers. TT2G42 and TT2G43 contain four scale Likert questions to investigate the teachers' behaviors for monitoring students' progress and learning. TT2G45 is a group of questions probing teacher and student relationship specifically. The coding and the emphasis of the questions are listed in Table 5.

| Teacher | Survey Questions * | Coding | Cronbach |
|----------------|---|---------------|----------|
| Quality Index | | | Alpha |
| Instructional | TT2G34A, Get students to believe they can do well | 1.Not at all | 0.845 |
| Implementation | in school work | 2.To some | |
| | TT2G34B, Help my students value learning | extent | |
| | TT2G34C, Craft good questions for my students | 3.Quite a bit | |

Table 5: Coding and Alpha for Latent Variables of Teaching Quality

| Table 5 | (cont'd) |
|---------|----------|
| | (com a) |

| | TT2G34E. Motivate students who show low | 4.A lot | |
|----------------|--|----------------|-------|
| | interest in school work | | |
| | TT2G34G, Help students think critically | | |
| Classroom | TT2G34D, Control disruptive behavior in the | 1.Not at all | 0.841 |
| Management | classroom TT2G34F Make my expectations about | 2.To some | |
| and | student behavior clear, TT2G34H Get students to | extent | |
| Organization | follow classroom rules | 3.Quite a bi | |
| C | TT2G34I Calm a student who is disruptive or noisy | 4.A lot | |
| Teacher- | TT2G45A, In this school, teachers and students | 1.Strongly | 0.772 |
| Student | usually get on well with each other | disagree | |
| Relationship | TT2G45B, Most teachers in this school believe that | 2.Disagree | |
| 1 | the students' well-being is important. | Agree | |
| | TT2G45C, Most teachers in this school are | 3.Strongly | |
| | interested in what | 4.agree | |
| | students have to say | U | |
| | TT2G45D) If a student from this school needs | | |
| | extra assistance, the school provides it | | |
| Engaging | TT2G42B, Students work in small groups | 1.Never or | 0.680 |
| Student | TT2G42C, I give different work to the students | almost never | |
| Learning | who have | 2.Occasionally | |
| U | difficulties learning | 3.Frequently | |
| | TT2G42D. I refer to a problem from everyday life | In all or | |
| | TT2G42E, I let students practice similar tasks until | 4.nearly all | |
| | I know that every student has understood the | lessons | |
| | subject matter | | |
| | TT2G42F, I check my students' exercise books or | | |
| | homework | | |
| | TT2G43D, I provide written feedback on student | | |
| | work in addition to a <mark></mark> | | |
| | TT2G42E, I let students evaluate their own | | |
| | progress | | |
| | TT2G43F, I observe students when working on | | |
| | particular tasks and provide immediate feedback | | |
| Constructivist | TT2G32A, My role as a teacher is to facilitate | 1. Strongly | 0.706 |
| Beliefs | students' own inquiry | disagree | |
| | TT2G32B, Students learn best by finding solutions | 2. Disagree | |
| | to problems on their own | 3. Agree | |
| | TT2G32C, Students should be allowed to think of | 4. Strongly | |
| | solutions to practical problems themselves before | agree | |
| | the teacher shows them how they are solved | | |
| | TT2G32D, Thinking and reasoning processes are | | |
| | more important than specific curriculum content | | |

* The loading of each question in the survey refers to APPENDIX D

Control Variables

The analyses require control variables including both school level demographic

information and principal background, as well as the teacher level factors. The coding and

variables used as controls are listed in the table below.

| | | Obs | Mean | Std. Dev. | Mir | n Max |
|-----------------------|--|-------------|---------|--------------|-----|-------|
| Principal Char | racteristics at Level 2 | | | | | |
| Gender | TC2G01 Female=1, Male=0 | 6,122 | 0.519 | 0.500 | 0 | 1 |
| Age | TC2G02 How old are you? Continuous variable | 6,103 | 50.577 | 8.221 | 23 | 73 |
| Education | TC2G03 | 6,091 | 2.991 | 0.301 | 1 | 4 |
| | 1 <below 5="" isced="" level=""></below> | | | | | |
| | 2 <isced 5b="" level="">(Associate)</isced> | | | | | |
| | 3 <isced 5a="" level="">(Bachelor)</isced> | | | | | |
| | 4 <isced 6="" level="">(Masters)</isced> | | | | | |
| Experience as a | a TC2G04B Year(s) working as a principal in total. | 5,735 | 8.671 | 7.186 | 0 | 45 |
| principal | Continuous variable | | | | | |
| Employment | TC2G05 Full time 1, part time 0 | 6,063 | 0.952 | 0.214 | 0 | 1 |
| status | | | | | | |
| School Factors | s at Level 2 | | | | | |
| Location | TC2G09 | 6,094 | 3.762 | 1.431 | 1 | 6 |
| | 1 [Hamlet or rural area] (1,000 people or fewer) | | | | | |
| | 2 [Village] (1,001 to 3,000 people) | | | | | |
| | 3 [Small town] (3,001 to 15,000 people) | | | | | |
| | 4 [Town] (15,001 to 100,000 people) | | | | | |
| | 5 [City] (100,001 to 1,000,000 people) | | | | | |
| | 6 [Large city] (more than 1,000,000 people) | | | | _ | |
| Publicly | TC2G010 | 6,116 | 0.858 | 0.350 | 0 | 1 |
| privately- managed | 1=Publicly-managed, 0=Privately-managed | | | | | |
| Government | TC2G011A:50% or more of the school's funding | 6,097 | 0.869 | 0.337 | 0 | 1 |
| Funded | comes from the <government> 1=Yes, 0=No</government> | | | | | |
| Size | TC2G014 the number of students, continuous | 6,025 | 658.305 | 493.801 | 0 | 4335 |
| | variables | | | | | |
| Low SES | TC2G015C percentage of students from | 6,032 | 2.839 | 1.085 | 1 | 5 |
| | socioeconomically disadvantaged homes | | | | | |
| | 1=None, 2=1% to 10%, 3=11% to 30%, 4=31% to | C | | | | |
| | 60%, 5=More than 60% | | | | | |
| Teacher Facto | rs at Level 1 | | | | | |
| Gender | TT2G01 Female=1, Male=0 | 104,35 5 | 0.680 | 0.466 | 0 | 1 |

Table 6: Control Variables and Coding Along with Descriptive Data

| Table 6 (cont' | d) | | | | | |
|----------------|--|-------------|--------|--------|----|----|
| Age | TT2G02 How old are you? Continuous variable | 104,26 9 | 42.512 | 10.538 | 18 | 76 |
| Employment | TT2G03 | 102,13 | 0.796 | 0.403 | 0 | 1 |
| status | 1=Full-time (more than 90% of full time hours) | 6 | | | | |
| | 0= Part-time (0-90% of full-time hours) | | | | | |
| Experience as | a TT2G05B Year(s) working as a teacher in tota | 1.97,773 | 16.139 | 10.382 | 0 | 58 |
| teacher | Continuous variable | | | | | |
| Tenure | TT2G06 | 102,46 | 0.816 | 0.388 | 0 | 1 |
| | 1 Permanent employment | 4 | | | | |
| | 0 Fixed-term contract | | | | | |
| Education | TT2G10 | 102,91 | 2.907 | 0.393 | 1 | 4 |
| | 1 <below 5="" isced="" level=""></below> | 0 | | | | |
| | 2 <isced 5b="" level=""></isced> | | | | | |
| | 3 <isced 5a="" level=""></isced> | | | | | |
| | 4 <isced 6="" level=""></isced> | | | | | |
| Teacher | TT2G11 1 Yes; 0 No | 102,57 | 0.884 | 0.320 | 0 | 1 |
| education or | | 8 | | | | |
| training | | | | | | |
| program | | | | | | |

Analytic Approaches

The first essential step for further analysis to answer the research questions is to construct the latent variables for both the dependent and independent variables.

Latent Variable Constructs for Formal and Informal Leaders' Participation

Model Specification

I begin this chapter with a discussion of decisions made during the model building process. Complex survey data are obtained by stratifying or cluster sampling so there exists an unequal probability of selection (Muthén & Satorra, 1995). Researchers have developed two approaches to analyze complex survey data (Lee & Forthofer, 2006). One approach is to compute standard errors and a chi-square test of model fit taking unequal probability of selection into account (Muth´en & Muth´en, 1998-2015). The analyst adds stratification or cluster variables when fitting models. The difference between stratification and cluster is that stratification assumes the groups are different, the example is like gender or race; the cluster sampling treats all the groups as equal or identical, like all the schools clustered in one district or all the classes clustered in one school (Muth´en & Muth´en, 1998-2015), the schools and the classes are identical. The second approach for handling complex data is to apply a multi-level model to account for the non-independence of the observations due to the nature of the nested data by cluster or stratification (Muthén, & Muthén, 2002-2015).

The TALIS 2013 used a two-stage cluster sampling design, wherein schools were firstly randomly selected within the country boundary, then the second selection was the teachers within each school (OECD, 2014). With this type of design, the standard errors and variance could be underestimated with the assumption of simple random sampling procedures (Raudenbush & Bryk, 2002; Snijders, 2011). To avoid the estimate bias using the complex survey data, this study adopted software Mplus 7 that is commonly used for latent variable construction and multilevel models with the capacity of dealing with complex data. When fitting the model, the first approach was applied by specifying TYPE=COMPLEX for the ANALYSIS command in conjunction with the "Stratification" options for principal data to construct latent variables of distributed leadership. The stratification variable is IDCNTRY, which indicated the schools were sampled within the country in order to take into account of the non-independence of the school principal data for stratified sampling effect (Muthén, & Muthén, 1998-2015). The reason for using "stratification" rather than "cluster" was due to the fact that the countries involved in the research were not considered as identical in terms of the differentiated educational policy, priorities, culture and resources for individual participating country (Den Hartog, House, Hanges, Ruiz-Quintanilla, & Dorfman, 1999; Dorfman et al., 1997; Maxwell & Ross Thomas, 1991).

Because the probability of being sampled was unequal for each observation, and the sampling response rate varied from country to country (OECD, 2014), it is essential to add sampling weights to account for the uneven selection probabilities of the observations and differentiated response rate in the TALIS 2013 samples for each school and for each teacher. Sampling weights were rescaled for each country by OECD using multiple steps to compensate for both unequal selection probability and response rate adjustment, which ensured that each observation had equal contribution to the estimation (OECD, 2014).

In Mplus7, the observed outcome variables can be continuous, categorical, counts, or combinations of these variable types (Asparouhov & Muthen, 2005). Unlike continuous variables that rely on the means, variances, and covariances for statistical analysis, the same estimation is basically meaningless for observed categorical variables (i.e., binary or ordinal observed variables) due to the lack of substantive metrics for calculation (Jöreskog, 2005). A model with categorical outcome variables will need different model specification compared to a model with continuous manifests. Treating categorical observed variables as if they were continuous might undermine the accuracy of parameter estimates (Li, 2014).

The outcome variables used in this research for latent constructs of interest were either binary variables that indicated whether the particular group participated in each of the leadership responsibilities, or ordinal variables that asked the principals' or teachers' perception towards specific leadership roles or capacities (4 scales). When fitting the model, the variables were identified specifically as CATEGORICAL for the binary and ordinal variables, which allowed the models to use WLSMV (Mean- and Variance-adjusted Weighted Least Square) estimator (Muthén and Muthén, 2015). WLSMV is a robust estimator that does not assume multivariate normally distributed variables and provides the best option for modelling categorical or ordered

data (Muthén, 1984; Muthén, du Toit, & Spisic, 1997).

For more detailed theoretical framework of the estimation method, Muthén (1984) contributed significantly fitting a model with categorical manifests using a weighted least squares (WLS) approach, which used polychoric correlation estimation. The thresholds and polychoric correlations are estimated using two-stage Maximum Likelihood estimation. Then the parameter estimates are then obtained using a consistent estimator of the asymptotic covariance matrix of the polychoric correlation and threshold estimates in a weight matrix, to minimize the weighted least squares fit function as developed by Muthén (cited from Li, 2014). While, the further development of WLSMV moved beyond WLS and was demonstrated by Flora and Curran (2004) that WLSMV provides less overestimated parameter estimates, less negatively biased standard errors, and less inflated chi-square than WLS. Yang-Wallentin, Jöreskog, & Luo (2010) revealed that the performance of WLS was uniformly worse in terms of parameter estimates, standard errors, and chi-square statistics, than WLSMV. Based on the available literature, this research adopted WLSMV as the estimator method for constructing the latent interest using categorical outcomes.

Unlike a structural model with continuous manifests, the variances of estimate errors are not identified in a model with categorical outcomes. These variances can be identified by either standardizing the latent response that is default given by the *Delta* parameterization in M*plus*, or standardizing the residual variance as *Theta* parameterization in Mplus language (Muthén & Muthén, 2010). In order to introduce metrics for the latent response variables with categorical outcomes, the variances of the latent response variables have to be standardized to be equal to 1 in Delta parameterization, while Theta parameterization effectively "control" for possible differences in residual variance because the measurement error was standardized. Theta

parameterization allows one to obtain information on unexplained variance in the observed indicators of factors, which is of more interest in this research. However, for the purpose of the comparison among countries regarding the leadership distribution for each leadership function, each of the latent response variables in the model was also standardized (mean=0, variance=1), in order to compare counties for the pattern of the leadership distribution by laying them on a scatterplot centered at zero.

To determine the model fit to the data, different fit indices were used. These included the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMSR). These indices all evaluated the correspondence between the observed data with the expected data pattern based on the estimated model (Brown, 2006.) Generally, the models met conventions of good model fit: $CFI \ge 0.95$, $TLI \ge 0.9$, $RMSEA \le 0.08$, and $SRMSR \le 0.05$ (Hu & Bentler, 1999)

Item Response Theory used for Latent Variable Construct

To examine the pattern for the involvement of both formal and informal leaders into each of the leadership functions, the very important step is to construct the latent variables regarding the extent of participation in each leadership function by the two interested groups, defined by the observed items in the principals' survey. This research used item response theory (IRT) to confirm the expected continuous latent variables inferred from the observed categorical variables (Brown, 2006). In the area of educational testing and psychological measurement, latent trait analysis is termed Item Response Theory (IRT). There is so much overlap between LTA and IRT that these terms are basically interchangeable (Uebersax, 1993). IRT is a measurement model using a multivariate regression model that describes the relationships between a set of categorical observed dependent variables and a continuous latent variable. In addition to the observed manifests and the latent construct, the model also contains a matrix of factor loadings, a vector of intercepts and a vector of residuals.

$$y = \tau_y + \Lambda_y \eta + \varepsilon$$
$$\varepsilon \sim N(0, \sigma^2)$$

The vector of factor loadings for p number of items $\Lambda = (\lambda_1 \ \lambda_2 \dots \lambda_2)$ is the vector of regression slopes for predicting items y_1 to y_p to form the latent factor. The vector of τ intercepts is the predicted values for the items when the value for η is zero. The vector of residuals ε is a unique contributor to the variances in the items that are not explained by the latent variable.

Figure 9: Path Diagram for a One-Factor CFA Model



Figure 9 illustrates one example of the relationships between the latent variable η with the

observed variables and the residual variances of the variable for an IRT model. Here, the latent variable "Informal Leaders' Participation in Setting the Direction" η is depicted as an oval; the boxes represent the observed variables y_1 to y_3 . The factor loadings λ_1 to λ_3 , represented by the single-headed lines, describe the relationships between the latent variable η and the observed variables y_1 to y_3 . ε_1 to ε_3 in circles are the residuals, and θ_1 to θ_3 are the residual variances represented by the double-headed lines. The triangle represents a mean structure, which is constrained to be 0 for this study and mean vector is α , the intercepts are τ_1 to τ_3 .

The model can also be rewritten in a matrix form as follows:

$$\Sigma = \Lambda_{\nu} \Psi \Lambda_{\nu}^{T} + \Xi_{\varepsilon}$$

Here, \sum represents the covariance matrix of the observed items y. Λ_y is the matrix of factor loadings λ_1 to λ_3 ; Λ_y^T is the transposed matrix of factor loadings. Ψ is the symmetric matrix of the factor covariances, and Ξ_{ε} is the diagonal matrix of residual variances θ_1 to θ_3 . The mean vector μ of y equals a vector of intercepts τ_{y_1} to τ_3 plus a matrix of factor loadings Λ multiplied by the mean vector α of η . The goal in CFA is to find a set of parameters that yields an estimated mean vector μ and a variance-covariance matrix Σ that best reproduces the observed matrix. A fitting function is used to minimize the discrepancy between the observed and the predicted matrix (Brown, 2006)

When the observed variables are categorical, the model is referred as item response theory (IRT) analysis as mentioned above (Baker & Kim, 2004; Du Toit, 2003). The observed dependent variables are referred as factor indicators and the continuous latent variables are referred as factors. The relationships are described by a set of probit or logistic regression equations for binary or ordered categorical factor indicators. This study used WLSMV estimator with probit regression.

In a confirmative factor analysis with linear regression, we would observe latent response y directly. But in a probit regression with binary or ordinal outcomes, we need to transform the dichotomous or ordered y into a continuous variable $y' \in (-\infty, \infty)$, therefor we need a link function F(y) that takes a dichotomous y and gives us a continuous, real-valued y' so we could run

$$F(y) = y' = \tau_y + \Lambda_y \eta + \varepsilon$$

Rather than observing y directly in a regression model, we can only observe y through a link of probability functions in a probit regression.

$$y_i = \begin{pmatrix} 0 \ if \ y_i^* \le 0\\ 1 \ if \ y_i^* > 0 \end{pmatrix}$$

When $(\Pr(y_i = 1))$, we assume that the model takes the form as

$$\Pr(y_i = 1 | X_i) = \Phi(\frac{-\eta' X_i}{\sigma})$$

Teacher Quality Two-order Model for Latent Variable Construct

The construct of teacher quality of a two order latent trait method involves fitting the first order of the seven sub scales of teacher quality and the construct the second order teacher quality on the seven sub scales in the same model. The model fit indicators for the latent trait model are good with CFI at 0.957 (>0.90) and TFI at 0.953 (>0.95), and RMSEA (Root Mean Square Error of Approximation) at 0.014 (<0.08), and these parameters indicate a satisfactory model fit (Hu & Bentler, 1999). The latent variable of teacher quality was standardized to have mean at zero and variance at 1 for the comparative convenience among participating countries.



Figure 10: Teacher Quality Latent Variable Construct

RQ 1: Correlation and Scatterplot of the Latent Variables for Formal and Informal Leaders' Leading Role

The construct of the latent variables laid the foundation for further analysis. To examine the pattern for the involvement of both formal and informal leaders into each of the leadership functions, the first step is to describe the extent of participation in each function by the two interested groups, defined by the observed items in the principals' survey. Because distributed leadership represents a capacity of a school, this analysis is conducted at the school level, based on reports of the principal. Specifically, I created formal leadership latent measurement for each of the five leadership functions and informal leadership latent variable for each of the five leadership functions. Due to differences in response patterns for some of the items, I standardized each scale (M=0, SD=1). Standardizing the continuous variables permits claims about high (= or > 1) or low (<1) levels of leadership, within the data set.

RQ 1: Correlation and Scatterplot

As discussed early in this chapter, the first question if to measure the pattern of distributed leadership, for each leadership function. I conducted correlation analysis to examine the

relationship between the formal leadership variable and the informal leadership variable and also generated a scatterplot for visual analysis (Research Question 1) in order to explore the position of the combined extent of participation by the two interested groups. The scatterplot displays the distribution of leadership functions in a two by two matrix according to the dimensions of involvement by formal and informal leaders into the particular function. I overlaid a quadrant on the scatterplot with the axes placed at the mean (0) of the standardized score on each measure. In this way, I situated each leadership function of distributed leadership to the other functions as either low or high on the dimensions of involvement by formal and informal leaders, or low on one dimension and high on the other.

Figure 11: Scatterplot of Formal and Informal Leaders' Participation in Each Leadership Role



RQ 2: Variance Analysis Using the Created Distributed Leadership Pattern Variable

Based on the distribution of each leadership function, I created a 4-scale categorical variable to parallel quadrant positions of distributed leadership pattern for each leadership function, that is, low on the extent of involvement for both formal and informer leaders as Uncertain Management (1), and high for formal leader's involvement while low for informal leaders' participation as Hierarchical Coordination (2), low on formal leaders' participation but high for informal leaders' participation as Cooperative Network (3), high on both extents as Collective Network (4), The visible manifestation of the quadrant is illustrated in Figure 11.

With separate analyses for leadership function, the categorical measure of formal and informal leadership distribution described above was used as a factor to explore whether the schools with varied contextual and compositional conditions vary significantly in adopting distributed leadership patterns. I used three approaches for the variance analysis based on the data distribution of the variables examined. For the categorical variables, I used Chi-square test because two of the investigated variables are both categorical; for ordinal variable, I used the Kruskal Wallis test because the Kruskal Wallis test does not assume normality of data for dependent variable and works for independent variable with more than two levels (UCLA). For the continuous variable, one-way ANOVA was used.

Within schools, school structural and compositional features are a set of variables that have been proved to account for a portion of school variance (Heck & Hallinger, 2009). Some of the salient features include the socioeconomic status of the student body, ethnic or social homogeneity, school enrollment size and the management type. All the factors conjointly create a context in which principals exercise leadership (Hallinger, Bickman, & Davis, 1996). At the school level, previous research has identified these exogenous variables as important predictors

for school variations in leadership type and school outcomes (Hallinger et al., 1996; Zheng, 1996). These variables include management type (Allison, 1986; Murphy, 2008; Williamson, 2011), student composition (Bryk et al., 1988), location (Hallinger et al., 1996) and school size (Goldberg, 2002). The school's contextual environment restraints and shapes the condition in which the principal leads the staff for instructional excellence. One school leadership style could not universally work across schools that are located in different jurisdictions bearing various community need to serve different students (Brezicha et al., 2015; Hallinger et al., 1996).

In addition, the principal characteristics are also important factors that impact principal's leading strategies and performances (Smith, Maehr, & Midgley, 1992). Variables such as gender, age, credential and stability are potentially essential for this regard. Though not much research is available for the direct impact of principal's characteristics on the leadership perception and behaviors, research done by Zheng (1996) provided empirical evidence that principal gender, age, education, work experience are significantly related to principals' perceived effectiveness in instructional leadership. Therefore, the individual characteristics are important exogenous variables being included in this research to investigate how the school leader characteristics may be related to the extent to which leadership is distributed in the school.

The analysis of variance is to compare the school context, and the principal characteristics dependent on distributed leadership patterns. The school context comparison includes schools' size; management type, funding resource and the school socioeconomic composition, the principal background includes principal's age, gender, education, and experience. This investigation of school, and people factors provide comprehensive understanding of what variation exists among schools that adopt different leadership distribution patterns, that involved either more or less informal leaders to participate in schools decision making, guiding the other

people, designing an organization and managing school instructional practice and assessment.

RQ 3: Hierarchical Linear Regression and Meta-analysis

Due to the fact that school is a nested organization, more researchers are using multilevel modeling instead of multiple regression because of its ability to account for the nested structure of data in a system (Raudenbush & Bryk, 2002). Challenges to analyzing these data include within-cluster dependencies, homogeneity and with-cluster covariation, and sources of variation within and across clusters (Raudenbush & Bryk, 2002). Several programs and approaches have been developed to conduct multi-level modeling, and Hierarchical Linear Modeling (HLM) (Garson, 2013) is among them to be widely used. HLM simultaneously investigates relationships within and between hierarchical levels of stratified data, which makes it more efficient at accounting for variance among variables at different levels (Raudenbush & Bryk, 2002). This is best summarized by the following statement from Hallinger and Heck, "when studying the interrelationships among principal, teacher, and student-level variables... the structural features of educational organizations take on particular importance. Principals are likely to influence the school level of the organization more directly than classroom, e.g., how teachers organize instruction, or student levels, e.g., the motivation of particular students" (Hallinger & Heck, 1998, p. 180). Applying HLM to analyses of the TALIS 2013 data in this study is appropriate because it can account for the dependency of teachers nested in one school, as we discussed earlier that TALIS administered two questionnaires to the principal and the teacher respectively.

Variables

When teaching quality at level one is the dependent variable and distributed leadership pattern at level two is the independent variable, these following variables are control variables

(Refer to Control Variable section for coding and descriptive data.)

Level Two Controls

- School background
 - School size, number of students enrolled;
 - School Location as rural, village, small town, town, city, big city;
 - Public or private management
 - School funding, 50% or more of the school's funding comes from the <government>
 - School socioeconomic status (SES): Percentage of students from disadvantaged homes.
- Principal background
 - Principal Gender
 - Principal Age
 - Principal Education
 - Principal Experience as a principal
 - Principal Working Status

Level one controls: teacher background

- Teacher Gender
- Teacher Age
- Teacher Employment Status as Part Time or Full Time
- Teacher Employment Status as Tenure or Fix Term
- Teacher Education
- Teacher Experience
- Teacher Training Experience

Two-Level Hierarchical Linear Model

The two-level Hierarchical Linear Model has the dependent variables set as teaching quality and independent variable included as the leadership distribution among formal and informal leaders in the school, controlling a set of antecedent variables at the school and teachers levels. The figure below is a visualized demonstration of the model used in this study for each individual country.



Figure 12: The HLM of Distributed Leadership and Teacher Quality

Specifically, the teacher-level model for the baseline model (Model 1) is:

$$(TQ)_{ij} = \beta_{0j} + r_{ij}$$
(1)
$$r_{ij} \sim N(0, \sigma^2)$$

Where $(TQ)_{ij}$ is the score on teaching quality for teacher *i* in school *j*, β_{0j} is the average score of teaching quality in school j, r_{ij} is the teacher level random effect, and σ^2 is the variability within schools. The corresponding school-level model is:

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$
(2)
$$\mu_{0j} \sim N(0, \tau_{00})$$

Where γ_{00} is the grand mean (or intercept), μ_{0j} is the school-level random effect, and τ_{00} is the variability across schools.

The teacher-level model for the study is as follows:

$$\begin{split} TQ_{ij} &= \beta_{oj} + \beta_{1j} \left(TGender \right) + \beta_{2j} (TAge) + \beta_{3j} (TEmployStatus) \\ &+ \beta_{4j} (TTenure) + \beta_{5j} (TEducation) + \beta_{6j} \left(TExperience \right) + \beta_{7j} \left(TTraining \right) \\ &+ r_{ij} \end{split}$$

$$r_{ij} \sim N(0, \sigma^2) \tag{3}$$

Where $\beta_{1j} - \beta_{7j}$ are the coefficients (effects) of the covariates of teacher backgrounds on TQS with other parameters remaining the same as in the baseline model. The school-level model for the control model is as follows:

$$\begin{split} \beta_{0j} &= \gamma_{00} + \gamma_{01} (Size) + \gamma_{02} (Location) + \gamma_{03} (Pub \ or \ Private) + \gamma_{04} (SES) \\ &+ \gamma_{05} (Funding) + \gamma_{06} (PGender) + \gamma_{07} (PAge) + \gamma_{08} (PEducation) \\ &+ \gamma_{09} (PExperience) + \gamma_{0(10)} (PStatus) + \gamma_{0(11)} (DLMI) + \gamma_{0(12)} (DLDP) \\ &+ \gamma_{0(13)} (DLH) + \gamma_{0(14)} (DLSD) + \gamma_{0(15)} (DLSLY) + \mu_{0j} \end{split}$$

$$\mu_{0\,i} \sim N(0, \tau_{00}) \tag{4}$$

Where $\gamma_{01} - \gamma_{05}$ are the coefficients (effects) of school background on the intercept with other parameters remaining the same as in the school baseline model. Where $\gamma_{06} - \gamma_{010}$ are the coefficients (effects) of the principal background on the intercept with other parameters remaining the same as in the control model, and $\gamma_{0(11)} - \gamma_{0(15)}$ are the coefficients (effects) of the covariates of the pattern of distributed leadership for each leadership function on the intercept. The measurement for distributed leadership pattern for each leadership function will include the continuous variable scaled for formal and informal leaders' participation in each of the leadership responsibilities respectively. Note that due to the correlation found between formal and informal leaders in some of the leadership responsibilities (managing instruction, developing people). I fitted the model for informal leader and formal leaders' participation in leadership responsibilities respectively in two models.

Meta-analysis synthesizing 32 countries' HLM results

After getting the HLM results for each of 32 countries, I did a meta-analysis to synthesize the coefficient effect generated from each country to detect the relationship between the variables of interest using fixed effect. Teacher quality is most likely endogenous to individual country's cultural, social and political context (Den Hartog et al., 1999), the comparative study generally has included country-level variables as either random effect by adding a country level random effect in a multi-level model, or including country dummy variables as fixed effect for country variance. TALIS data does not include the explicitly quantified distinctions at country level, therefore, many researchers used dummy variables to account for each country's unique fixed effects (Chudgar, Luschei, & Zhou, 2013; Zhou, 2014).

This research acknowledges the country-level uniqueness regarding their country

contextual condition and education policy, culture and belief, which should account for teaching quality and many practices within the country boundary (Hofstede, 1984; Hoppe, 2004). Therefore, this study first fit the Hierarchical Linear Model for each individual country, then I conduct a meta-analysis synthesizing findings of the coefficient effect for individual countries regarding how the extent of formal and informal leaders' participation in leadership responsibilities impact the teaching quality.

Meta-analysis is a statistical approach to combine results of the quantitative findings for a set of researches that have the similar interest of dependent and independent variables, in order to analyze the results and explain differences more precisely. The essential component in a meta-analysis is to calculate the overall effect by combining the effect derived from each individual study using appropriate approach. Researchers argue (Hong & Breitling, 2008) that meta-analysis achieves more reliable results than an individual analysis, and leads to a much higher reproducibility among independent studies.

A simple arithmetic average of the results from all the studies would give misleading results (Egger, Smith, & Phillips, 1997; Littell, Corcoran, & Pillai, 2008). Meta-analysis weights the study results based on the size of the samples, in which the study with larger samples have more influence than the study with smaller samples. Meta-analyses assign weights to individual studies using the principle of the inverse of the overall study error variance (that is, 1/variance), which provides a generic approach for meta-analysis to combine estimates of a large variety of metrics, including regression coefficients that is the interest of this study. Studies with a low variance or more precise estimate of the effect size are assigned more weight, while studies with a high variance of the population effect size are on the other hand assigned less weight.

The statistical techniques used in meta-analysis are generally classified into two models

(Hedges & Vevea, 1998) as "fixed effects" or "random effects". The difference between these two models are in the way the variability of the results between the studies is treated. The "fixed effects" model assumes that the variability is exclusively due to random variation (Borenstein, Hedges, Higgins, & Rothstein, 2010). The "random effects" model, on the other hand, assumes there is a different underlying effect for each individual study and therefore, takes this into consideration as an additional explanation of variation. Random effect model usually generates wider confidence intervals than the fixed effects model due to including additional factor into consideration (Egger et al., 1997; Hedges & Vevea, 1998; Littell et al., 2008). Both in fixed and random effect models, effects are assumed to be randomly distributed, and the central point of the effect distribution is the combined effect estimate. Although neither of two models can be said to be "perfect", heterogeneous test is frequently used to decide which model is more appropriate for the meta-analysis of a set of studies.

For this study, I first fitted Hierarchical Linear Model for each country applying weights at both the school and the teacher level, therefore, I assume that each country shares a true effect size due to adjusting the weights that compensates for the unequal selection probability in a two stage clustering sampling method and the unequal response rate for each country. Therefore, each sample in one country represents the population equally, so when synthesizing the results from 32 individual countries or 32 individual studies, I applied fixed-effect model for this study. Stata 14 with the third party program "Metan" and "Metap" were used for the meta-analysis and the p-value synthesis. Fisher's combined probability test that is the most wildly adopted method for combining p-value for meta-analysis was used for this research for detecting the P-value for each effect size.

Fisher's method combines extreme value probabilities (P-value) from each study, into one

test statistic (X^2) using the formula

$$X_{2k}^2 \sim -2\sum_{i=1}^k \ln(p_i),$$

where p_i is the p-value for the *i*th hypothesis test. When the p-values tend to be small, the test statistic X² will be large, which suggests that the null hypotheses are not true for every test. When all the null hypotheses are true, and the p_i are independent, X² has a chi-squared distribution with 2*k* degrees of freedom, where *k* is the number of tests being combined. This fact can be used to determine the p-value for X² (Egger et al., 1997; Littell et al., 2008).

Measuring the inconsistency of studies' results

The classical measure of heterogeneity is Cochran's Q, which is calculated as the weighted sum of squared differences between individual study effects and the pooled effect across studies, with the weights being those used in the pooling method. Q is distributed as a chi-square statistic with k (number of studies) minus 1 degrees of freedom. Q has too much power as a test of heterogeneity if the number of studies is large (Higgins & Thompson, 2002).

The I² statistic describes the percentage of variation across studies that is due to heterogeneity rather than random chance (Egger et al., 1997; Higgins & Thompson, 2002). I² = 100% x (Q-df)/Q. I² is an intuitive and simple expression of the inconsistency of studies' results. Unlike Q, it does not inherently depend upon the number of studies considered.

Conclusion:

This chapter examined the methodology employed in this research. It included the introduction of TALIS 2013 questionnaires and sampling method, testing of data, the decision of variables from the TALIS dataset to be included in this study and the clustering of the variables for measuring both distributed leadership pattern and teacher quality using exploratory factor

analysis. After aligning the variables from TALIS 2013 questionnaire with the theoretical framework developed in chapter two, the researcher did correlation and Cronbach Alpha for each of the factors constructed for measuring the independent and dependent variables in order to test the reliability of the constructed measure sets.

The first research question will be measured using correlation and a scatterplot to display the distribution of leadership functions in a two by two matrix according to the dimensions of involvement by formal and informal leaders into the particular leadership function. Then a new four-scale categorical variable will be created based on the position of the distributed leadership pattern on the quadrant. The new categorical variable will be used as the dependent factor to explore the difference of demographic and principal aspect among the schools adopting different distributed leadership patterns. The most important question in this study is to explore the relationship between distributed leadership and teacher quality that nested at different levels of the school system. Hierarchical Linear Model was used that can account for the hierarchy of data and school structure that comes from a nested system and the violation of the independence of observations it creates by accounting for shared variance. HLM simultaneously investigates relationships within and between hierarchical levels of stratified data, which makes it more efficient at accounting for variance among variables at different levels (Raudenbush & Bryk, 2002). Meta-analysis was last applied to synthesize all effects generated from individual country data for both formal leaders and informal leaders' participation in leadership responsibilities for the final effect of both formal and informal leaders' impact on teaching. The next chapter will discuss the findings.

CHAPTER 4: ANALYSIS AND FINDINGS

This chapter presents the statistical findings for each question and the interpretations of the findings in depth. This research first emphasized the pattern of leadership distribution among formal and informal leaders regarding five leadership functions: setting the school direction, developing people, managing instruction, hiring people and setting the salary scales. To answer this research question, the author proposed a scatterplot of the latent trait scores for the combination of both formal and informal leaders' participation in particular function, with the intention to demonstrate the pattern of leadership distribution for each leadership function across countries. The TALIS 2013 involved 34 countries in the survey and contains data publicly available for 32 countries, this study included all the 32 countries that have public data. Before demonstrating the scatterplot results, the model fit results for both formal and informal leaders' participation in each of the five leadership functions are presented first.

Model Fit Indexes for Variable Construct

The IRT model building for each of the ten latent variables of distributed leadership was a two-stage process. First, all the observed items extracted for the individual latent variable were included in the model without any covariance connection. The model fit was tested but the model fit indices were not satisfied. I ran the modification indices for the model using Mplus7 and found that each leadership function with the answer of the same leader group were highly correlated, therefore the covariance for the items regarding the same leader group were added to relevant models. Each model (with the exception for the function of setting the direction) not only included regression connection but also the covariance in the model. Syntax and model details could be found in the appendix. Table 6 demonstrated the model fit indices for all of the latent variables that were constructed for measuring distributed leadership patterns through

confirmatory factor analysis.

| Constructs | CFI | TLI | RMSEA |
|--------------------------------|-------|-------|-------|
| Setting Direction- Informal | 1 | 1 | 0 |
| Setting Direction-Formal | 1 | 1 | 0 |
| Managing Instruction-Formal | 0.945 | 0.920 | 0.044 |
| Managing Instruction-Informal | 0.956 | 0.929 | 0.023 |
| Developing People-Formal | 0.980 | 0.965 | 0.022 |
| Developing People-Informal | 0.979 | 0.967 | 0.026 |
| Hiring People-Formal | 0.965 | 0.906 | 0.094 |
| Hiring People-Informal | 1 | 1 | 0 |
| Salary and Incentives-Formal | 1 | 1 | 0.004 |
| Salary and Incentives-Informal | 0.955 | 0.865 | 0.038 |

Table 7: Model Fit Indices for Each Distributed Leadership Latent Variable

For the teacher quality latent construction, there were also model building and testing procedures done for each of the latent variables. Because there was no model fit issue found, the model of each teacher quality latent variable only included regression connection between the observed and latent variables. No covariance variable was necessary.

| Constructs | CFI | TLI | RMSEA |
|------------------------------|-------|-------|-------|
| Instructional Implementation | 0.997 | 0.992 | 0.024 |
| Classroom management and | 0.997 | 0.992 | 0.036 |
| organization | | | |
| Engage Student in Learning | 0.993 | 0.986 | 0.041 |
| Teacher-student relationship | 0.996 | 0.989 | 0.031 |
| Monitoring student progress | 0.957 | 0.935 | 0.022 |
| Constructivism | 0.992 | 0.976 | 0.028 |

Table 8: Model Fit Indices for Each Teacher Quality Latent Variable

Findings for Research Question 1: Identification of Five leadership Distribution Patterns

The section above explained the procedure of calculating the scaled score for each of the latent variables that stand for formal and informal leaders' participation in each of the five leadership functions. In turn, I generated 10 latent variables with scaling. As discussed early in

this dissertation, the first question is to demonstrate the pattern of distributed leadership, I used a scatterplot analysis (Research Question 1) to explore the position of the combined extent of participation by the two interested groups. The scatterplot displays the distribution of leadership functions in a two by two matrix according to the dimensions of involvement by formal and informal leaders into the particular function. The intersection for the two by two matrix scatterplot was laid at zero because each of the latent interests was standardized to be zero. I overlay a quadrant on the scatterplot with the axes placed at zero on each measure. In this way, I situate each country of their distributed leadership pattern to the other countries as either low or high on the dimensions of involvement by formal and informal leaders, or low on one dimension and high on the other. Therefore, it is meaningful to have the plot of the chosen countries to compare their distributed leadership pattern regarding individual leadership function.

The Result of the Distributed Leadership Patterns for Each Leadership Function

The combination of the two groups' participation in each of the leadership functions generated five scatterplots to demonstrate the pattern of leadership distribution for each of the leadership functions across 32 countries.

The first scatterplot is about the pattern of how formal and informal leaders participate in setting the school direction. Form the scatterplot, it is clear that there is less variance between countries for informal leader's participation in setting school direction than the formal leaders' participation. As the latent variable was standardized among 32 countries, the distribution is relative among the 32 countries, but we do see the pattern that formal leaders' participation in setting school direction varied more significantly than the role of informal leaders among the participating 32 countries



Figure 13: Distributed Leadership Pattern of Setting Direction

Table 9: The Country Distribution for Distributed Leadership Pattern of Setting direction

| Alberta (Canada), Australia, Netherland, Poland, Singapore, Slovak Republic, Sweden | Bulgaria, Czech Republic, Denmark, England, Estonia, Finland, Flanders(Belgium),France, Italy, Latvia, Norway, Serbia |
|---|--|
| Abu Dhabi, Chile, Israel, Malaysia, | Brazil, Croatia, Japan, Korea, |
| Mexico, Spain | Portugal, Romania, United States |

Among the 32 countries, I found more European countries including Bulgaria, Czech Republic, Denmark, England, Estonia, Finland, Belgium, France, Italy, Norway and Serbia are in Section 4 that has higher level of both formal and informal leaders' participation in setting school direction (that is, both measures are above the mean of the sample). Brazil, Croatia, Japan, Korea, Portugal, Romania, and United States respondents, in Section 3, also report informal leaders' involvement in setting school direction above the sample mean, but this is not the case for the formal leaders. The groups in section 2 are among those that have high level of formal leaders' participation but low level of informal leader' power in setting school direction; these countries are Canada, Australia, Netherland, Poland, Singapore, Slovak Republic, and Sweden. The last group, Section 1, consists of those countries, compared to the other countries, have low level of participation from both formal and informal leaders' participation in setting the school direction. An interesting finding is that there is higher variation in leadership for setting direction for formal leaders (along the y axis) while the variation by informal leaders is more constrained (along the x axis.)

Figure 14: The Country Distribution for Distributed Leadership Pattern of Developing People



The above scatterplot reveals the pattern on how the leadership function of developing people is fulfilled in the school by the position holders and non-position holders respectively. The distribution of 32 countries demonstrates there is significant variations among countries for both formal leaders and informal leaders regarding their roles of helping develop the staff.

Table 10: The Country Distribution for Distributed Leadership Pattern of Developing People

| Chile, Czech Republic, Estonia, Latvia, Netherland, Norway, | Abu Dhabi(United Emirates),Australia, Brazil, England, Israel, Japan, Malaysia, Mexico, Romania, Singapore, Slovak Republic |
|--|---|
| Alberta (Canada), Denmark, | Bulgaria, Croatia, Flanders |
| Finland, France, Italy, Poland, | (Belgium),Korea, Portugal, Serbia, |
| Sweden, United States | Spain |

For the 32 participating countries, the result indicates a relatively equal distribution of countries regarding the pattern of leadership distribution in developing people, though this time, more countries fall in Section 4 as both formal and informal leadership participate in the role of developing people. This corresponds to the finding by Leithwood and his colleagues (2007) that non-position holders are actively involved in developing the school staff. School assigned mentors and more skilled teachers in the school take important responsibility of helping the other teachers especially beginning teachers to develop skills and grow to be more effective in conducting instructional practice.

However, the countries that fall in section 2 or 3 have relatively lower participation from either formal or informal leaders in helping develop people. There also exist some countries that have comparatively lower level of contribution from both sides to participate in staff development in instructional practice. The countries (regions) in Section 1 include Alberta (Canada), Denmark, Finland, France, Italy, Poland, Sweden and United States. The appearance of Finland in pattern 1 is unexpected as Finland since 2000 has emerged as the top performance country on the international PISA (Program for International Student Assessment) test, researchers have swarmed into the country to study the educational system, and they reached a consensus that Finish schools have good teachers. In addition, the research also indicated that the teacher training and induction in Finish school are very important (Sahlberg, 2007). Thus, it might be the case that high investment in teacher training takes place before they begin service and that the continuous development that takes place over their careers does not happen in a way that is measured by the TALIS survey. Meanwhile, the position of the United States in this function is below the average on both leadership dimensions in this sample. A final observation for this function is that the variation in the formal and informal sources of leadership for developing people is relatively even.

The third scatterplot shows the distributed leadership pattern for managing instruction. Many researchers have made claims that instructional management and instructional decision making are the most important school leadership functions that include teachers in the process (Harris, 2009; Leithwood et, al., 2007; Spillane, 2006) The scatterplot of the countries for distributed leadership pattern of instructional management demonstrates more variation for both formal and informal leaders across 32 countries, which indicates that some countries have informal leaders proactively involved in instructional management, while the other countries do not. Also the scatterplot indicates that participation in instructional management from formal leaders and informal leaders are highly related.

The countries that fall in pattern four that have both formal and informal leaders contributed to the school instructional management are Czech Republic, Denmark, England, Estonia, Finland, Flanders (Belgium), Italy, Latvia, Netherland, Norway, Poland and Slovak Republic. It is interesting to observe that these countries are all located in Eastern or Northern

Europe. From literature, we know that for "many Scandinavian countries, distributed leadership is associated with more democratic and equitable forms of schooling" (Harris, 2011, p. 9). Therefore, undergoing educational reform in these countries take a more normative stance towards endorsing and reinforcing shared or collective leadership practices in the school. The policy reform have been primarily located in Western contexts with Hong Kong as the first Asian societies to have adopted distributed leadership pattern since 2000 (Harris, 2011). The literature provides theoretical support to the current finding that European countries do involve broad stakeholders in making school instructional decision, and managing instruction-related school functions.



Figure 15: Distributed Leadership Pattern of Managing Instruction

Meanwhile, the countries that have demonstrated pattern one (low on both sides) include Abu Dhabi (United Emirates), Brazil, Croatia, France, Japan, Korea, Malaysia, Mexico, Portugal, Spain, United States. Among these countries, most of them are in either South America or Asian, while the only three countries that are in Europe are located in Western Europe adjacent to each other. This is a very interesting finding regarding the leadership distribution pattern that policy, social context do impact how leadership is distributed among the stakeholders. Unfortunately, United States is also in the section of pattern one that indicates in the school, both the school position holders and teachers do not pay much attention to collectively make the school instructional decisions.

 Table 11: The Country Distribution for Distributed Leadership Pattern of Managing

 Instruction

| Alberta (Canada),Australia, Chile, Israel, Singapore | Czech Republic, Denmark, England, Estonia, Finland, Flanders(Belgium), Italy, Latvia, Netherland, Norway, Poland, Slovak Republic |
|--|---|
| Abu Dhabi (United Emirates), Brazil, Croatia, France, Japan, Korea, Malaysia, Mexico, Portugal, Spain, United States. | Bulgaria, Romania, Serbia, Sweden |

Figure 16 is the result for how both formal and informal leaders are involved in appointing or dismissing school staff. The result reveals that for the school leadership function of hiring school staff, non-position holders are playing significant roles in most countries, so the scattering of the informal leaders' participation in hiring staff is significantly screwed toward the right side. In another word, more countries have the mean of informal leaders' role in appointing teacher and dismissing or suspending teachers from employment above the grand mean of zero or very close zero even if it is negative.

The countries (regions) that lay in the left side of the scatterplot are Alberta (Canada), Czech Republic, Poland, Sweden in pattern 2 and Brazil, Finland, France, Italy, Japan, Korea, Malaysia, Mexico, Singapore, Spain in pattern 1.

Figure 16: Distributed Leadership Pattern of Hiring



These countries comparatively have lower extent of informal leaders' contribution in

hiring decision making. Again, more countries are in Asia and South America as Brazil, Japan,

Korea, Malaysia, Mexico, and Singapore.

Table 12: The Country Distribution for Distributed Leadership Pattern of Hiring

| Alberta (Canada), Czech Republic, Poland, Sweden | Australia, Bulgaria, Chile, Croatia, Denmark, England, Estonia, Flanders(Belgium), Israel, Latvia, Netherland, Norway, Portugal, Serbia, Slovak Republic, United States |
|--|--|
| Brazil, Finland, France, Italy, Japan, Korea, Malaysia, Mexico, Singapore, Spain | Abu Dhabi (United Emirates), Romania |
European countries are scattered randomly in different regions but the result once again indicates France and Spain are in pattern one that have relatively lower level of participation from both parties for the school leadership function of appointing and dismissing. Most countries in Asia except for Abu Dhabi (United Emirates) and Israel demonstrate a pattern of External Control that both the principal and teachers in the school don't have desired power towards making the decision of appointing teachers or dismissing them from the employment. Israel and United Emirates, though are located in Asia have been significantly influenced by European political principal and structure, therefore, it is not astonishing to see they belong to the group of Europe rather than Asia. While the rest countries like Korea, Japan, Malaysia and Singapore has a long history of centralized and hierarchical educational system (Mok, 2006), in which the school building leaders have less power than the governmental officials in making the decision of employment and dismiss. Instead, the decision is made by the central or reginal government with a more undisputed policy or regulation to direct all the schools in the nation.

Figure 17 is the scatterplot that demonstrates the result of how position holders and experienced teachers in the school are involved in setting the school salary scale and determine teachers' salary increases. The result demonstrates a very serried distribution of countries around the mean (Mean=0) of both formal and informal leaders' role in setting school salary scale and make the decision of increase the teachers' salary. The deflected countries are Bulgaria, Latvia, Netherlands, Slovak Republic, Estonia and England. These countries again are the countries that have established system and strategic approaches to promote distributed leadership primarily but not exclusively at school level (Harris, 2012). Consequently, these countries demonstrated a relatively high level of school principal or position holders' autonomy towards setting the salary scale.



Figure 17: Distributed Leadership Pattern of Setting Salary Scales

Table 13: The Country Distribution for Distributed Leadership Pattern of Setting Salary

| Australia, Czech Republic, Mexico, Netherland, Poland, Serbia, Singapore | Abu Dhabi (United Emirates), Bulgaria, Chile, Denmark, England, Estonia, Finland, Israel, Japan, Latvia, Norway, Slovak Republic, Sweden |
|--|--|
| Croatia, Flanders(Belgium),France, | Alberta (Canada),Brazil, Korea, |
| Italy, Portugal, Romania, Spain | Malaysia, United States |

While for most countries, there are not variations regarding whether the building leader and the teachers have the authority to make decision for staff salary and increase scales. This school leadership role is most likely fulfilled by the external authorities at different levels. More important issue need to be mentioned is that fewer school informal leaders participate in setting school salary scales and make decision on salary increase.

Variations of Distributed Leadership Patterns Cross Countries

When pooling all countries together with the five leadership distribution patterns, it is interesting to find that there is no consistent patterns regarding how leadership is distributed for all leadership functions in the school across country boundaries, with only one exception as England that has all leadership responsibilities shared among the school stakeholders. For England, both formal leaders as the principal and the management team and informal leaders including mentors and teachers proactively participate in all five leadership responsivities in the school. The other countries that have more Collective Network pattern of distributed leadership (Pattern 4) include Denmark, Estonia, Latvia, Norway, Slovak Republic. These countries are all located in Eastern or Northern Europe that have long seen democratic pattern of leadership as an essential component for equitable schooling (Harris, 2011).

The combined results reveal some important findings, first, for all the leadership responsibilities, we have observed pattern 4 of distributed leadership (Collective Network) more than the other patterns, which reveals an important reality that leadership responsibilities are generally fulfilled by both the formal and informal leaders in many countries. This finding resonates to what Leithwood and his colleagues (2007) found that teachers and other informal leaders are proactively involved in three vital school leadership functions as developing people, designing the organization, managing instruction.

The only leadership responsibility that is exclusively fulfilled by position holders in the school is setting the school direction. This is also consistent from what has been found in this research that compared to the other three leadership responsibilities emphasized in this study,

setting the school direction and setting the school salary scales reveal to have less pattern 4.

| Country | N(SCHOOS | SETDI | DPEP | MAINS | HIR | SALAR |
|----------------------|------------------|----------------|----------------|----------------|----------------|----------------|
| |) | R | | T | | Ŷ |
| Australia | 123 | 2 | 4 | 2 | 4 | 0 |
| Brazil | 1,070 | 3 | 4 | 1 | 1 | 3 |
| Bulgaria | 197 | <mark>4</mark> | <mark>3</mark> | 3 | <mark>4</mark> | 4 |
| Chile | 178 | 1 | 2 | 2 | 4 | 4 |
| Croatia | 199 | 3 | 3 | 1 | 4 | 0 |
| Czech Republic | 220 | 4 | 2 | 4 | 2 | 0 |
| <mark>Denmark</mark> | <mark>148</mark> | <mark>4</mark> | 1 | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| <mark>Estonia</mark> | <mark>197</mark> | <mark>4</mark> | <mark>2</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| Finland | <mark>146</mark> | <mark>4</mark> | 1 | <mark>4</mark> | 1 | <mark>4</mark> |
| France | 204 | 4 | 1 | 1 | 1 | 0 |
| Israel | <mark>195</mark> | 1 | <mark>4</mark> | 2 | <mark>4</mark> | <mark>4</mark> |
| Italy | 194 | 4 | 1 | 4 | 1 | 0 |
| Japan | 192 | 3 | 4 | 1 | 1 | 4 |
| Korea | 177 | 3 | 3 | 1 | 1 | 3 |
| <mark>Latvia</mark> | <mark>116</mark> | <mark>4</mark> | <mark>2</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| Malaysia | 150 | 1 | 4 | 1 | 1 | 3 |
| Mexico | 187 | 1 | 4 | 1 | 1 | 0 |
| Netherland | <mark>127</mark> | <mark>2</mark> | <mark>2</mark> | <mark>4</mark> | <mark>4</mark> | <mark>0</mark> |
| Norway | <mark>145</mark> | <mark>4</mark> | <mark>2</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| Poland | 195 | 2 | 1 | 4 | 2 | 0 |
| Portugal | 185 | 3 | 3 | 1 | 4 | 0 |
| Serbia | 191 | 4 | 3 | 3 | 4 | 0 |
| Singapore | 159 | 2 | 4 | 2 | 1 | 0 |
| Slovak Republic | <mark>193</mark> | 2 | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| Spain | 192 | 1 | 3 | 1 | 1 | 0 |
| Sweden | 186 | 2 | 1 | 3 | 2 | 4 |
| United States | 122 | 3 | 1 | 1 | 4 | 3 |
| England | <mark>154</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> | <mark>4</mark> |
| Flanders(Belgium) | <mark>168</mark> | <mark>4</mark> | <mark>3</mark> | <mark>4</mark> | <mark>4</mark> | <mark>0</mark> |
| Abu Dhabi (United | 1.5.5 | | | - | | |
| Emirates) | 166 | 1 | 4 | 1 | 3 | 4 |
| Alberta (Canada) | 182 | 2 | 1 | 2 | 2 | 3 |
| Romania | 197 | 3 | 4 | 3 | 3 | 0 |
| Total | 6,455 | 2.459 | 2.557 | 1.991 | 2.499 | .117 |

Table 14: Distributed Leadership Patterns in 32 Participating Countries

The only leadership responsibility that is exclusively fulfilled by position holders in the school is setting the school direction. This is also consistent from what has been found in this research that compared to the other three leadership responsibilities emphasized in this study,

setting the school direction and setting the school salary scales reveal to have less pattern 4.

Secondly, Asian countries like Japan, Korea, Malaysia and Singapore all demonstrated their schools have less involvement from both formal and informal leaders in the school decision making of hiring, setting school direction, setting salary scales and managing instruction, which resonates to the former researcher that Asian schools have more centralized and hierarchical school system that many school related decisions are made outside of schools by the educational agent and authorities (Dorfman et al., 1997; Hairon & Dimmock, 2012). But developing people has been consistently found in Asian countries to be collectively fulfilled by both formal leaders and informal leaders inside the schools.

Findings for Research Question 2: Variations among Schools by the Distributed leadership Pattern

This section of the dissertation is devoted to the second research question regarding how schools vary as categorized by different distributed leadership patterns.

The Distribution of the Distributed Leadership Patterns

Before I start the analysis, I think it is essential to describe my indictor factor in this section. The leadership distribution patterns emphasized here are the categorical variables created after the first research question to identify the extent of both formal and informal leaders' participation in leading each school responsibility. Each categorical variable includes four scales that represents the four distributed leadership patterns. As mentioned earlier, I constructed 10 latent variables responding to the extent of both formal and informal leaders' participation in each of the five leadership responsibilities. So the combination of the formal and informal leaders for the leaders' participation in each leadership responsibility formed 5 categorical variables for the leadership distribution pattern for each of the five leadership functions (refer to Figure 11), and

each variable has four scales.

These are identified as 1 (Uncertain Management) for low extent of participation by both formal and informal leaders, 2 (Hierarchical Coordination) as high for formal leader's involvement while low for informal leaders' participation, 3 (Cooperative Network) is standing for low on formal leaders' participation but high for informal leaders' participation, and the last one is 4 (Collective Network) that is high for both groups to participate in leading. These are categorical variables, and they are not normally distributed as demonstrated in the figure below.



Figure 18: Data Distribution of Distributed Leadership Patterns

From the data distribution, I observed that among all the countries, developing people and managing instruction have more pattern of Collective Network that both formal and informal leaders are leading, while setting direction and hiring have more Pattern 2 (Hierarchical Coordination) that only formal leaders are involved in these leadership responsibilities but not necessarily for informal leaders. In addition, for the schools' salary and incentive structure setting, both formal and informal leaders are not frequently involved in these roles as most schools demonstrate to have Pattern 1 (Uncertain Management) that indicates this role is fulfilled by neither the formal nor the informal leaders in the school.

How Principals' Characteristics Including Gender, Age, Education, Experience, and Working Status vary as Categorized by Different Distributed Leadership Patterns

In this research, one of the primary interests is to investigate how schools with different contextual conditions and principal characteristics vary as indicated by the distributed leadership patterns. The independent factor is the leadership distribution pattern for each leadership role, and the dependent variable is the school contextual and compositional factors and the principal characteristics.

Principal's gender and school leadership distribution patterns

The first emphasis is the school principal's gender and school leadership distribution patterns. In this case, both dependent outcome and independent indicator are categorical variables so Chi-square test is used to investigate whether there is a relationship between two categorical variables. The reason of not using ANOVA is because ANOVA works with the assumptions of Normality for at least one variable. In this case, both variables are not normally distributed as continuous variable does (UCLA).

The result indicates that for the leadership responsibility of hiring and setting the salary

scales in the school, there is no significant association between the principal's gender and distributed leadership pattern. However, there is statistically significant relationship between distributed leadership pattern and the principal's gender for the rest of the three leadership responsibilities. For setting the school direction, developing people and managing the instruction, female leaders are more likely to have informal leaders involved in the school leadership responsibilities. For the three leadership responsibilities, female leaders adopted pattern 3 and 4 more than the male leaders that indicates they provide the opportunities for the informal leaders to be involved in the school leading for these role. On the other hand, for the pattern that does not have informal leaders involved in leading (Pattern 1 and Pattern 2), schools with female leaders tend to have Pattern 1 that don't involve both groups in setting direction and managing instruction, more male leaders are in the schools that have only formal leaders leading in these roles (Pattern 2).

| Variable ^A | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|----------------|---------------|--------------|---------------|
| Setting Direction | .560*** (1215) | .489***(2548) | .509***(599) | .538***(1760) |
| Developing People | .483**(1616) | .511**(1386) | .550**(1119) | .536**(2001) |
| Managing | .512*(2112) | .487*(940) | .557*(879) | .524*(2191) |
| Instruction | | | | |
| Hiring | .507(2357) | .527(2405) | .574(296) | .511(1064) |
| Salary Setting | .522(4003) | .510(1878) | .520(25) | .536(216) |

Table 15: Principals' Gender and Distributed Leadership Patterns

*P<0.05; **P<0.01; ***P<0.001

A=Chi-square test

Parameter is the Mean, observation number in the parentheses

Principal's age and school leadership distribution patterns

The Table 15 displays the result of how variation exists between principals of different ages for their school leadership distribution structure. For the variance analysis of the principal's age and the distributed leadership patterns, dependent variable is a continuous variable (age) so one-way ANOVA was used for the analysis. One-way ANOVA is best for one continuous variable with independent variables of more than 2 levels (UCLA).

| Variable ^B | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|-----------------------|-----------------|----------------|-----------------|
| Setting | 49.396*** (1213) | 51.298***(2546) | 50.007***(596) | 50.542***(1748) |
| Direction | | | | |
| Developing | 50.659(1612) | 50.583(1390) | 50.057(1113) | 50.798(1988) |
| People | | | | |
| Managing | 50.201**(2105) | 50.785**(941) | 50.536**(879) | 50.867**(2178) |
| Instruction | | | | |
| Hiring | 50.160***(2350) | 51.128***(2406) | 48.868***(295) | 50.730***(1052) |
| Salary Setting | 50.154***(3998) | 51.326***(1875) | 49.360***(25) | 52.137***(205) |
| *D -0.05. | **D -0 01. ***D -0 00 |)1 | | |

Table 16: Principals' Age and Distributed Leadership Pattern

*P<0.05; **P<0.01; ***P<0.001

B=One-way ANOVA

Parameter is the Mean, observation number in the parentheses

The result indicates that there is significant variation among principals of different age groups for leadership distribution patterns in four roles. For setting school direction, older principals tend to be more proactive in this leadership role as demonstrated by distributed leadership pattern 2 (Hierarchical Coordination) and 4 (Collective network). This pattern is also applied to the school leadership roles of managing instruction and hiring, in which elder principals are having more influence and executive force, and they are also more likely to involve informal leaders in fulfilling these leadership roles.

In addition, though many schools do demonstrate pattern 4 (Collective Network), there are also a large proportion of schools demonstrating to have pattern 1 that both formal and informal leaders are not involved in setting the direction and managing instruction. For setting the school salary scales, a large proportion of schools (3998) are associated with Pattern 1 so for most schools, this leadership role is not the main responsibility of both formal leaders and informal leader inside the school. About 1/3(1875) of the school have the Pattern 2 that only formal leaders decide the school incentives and salary. But it is also found that the average age of the

principal is older in schools that adopted Pattern 4 that both formal leader and informal leaders participate in setting the school salary scale. In general, younger principals tend to exclude informal leaders in collaboratively fulfilling schools responsibilities as demonstrated as the distributed leadership pattern of either 1 or 3.

Principal's education and school leadership distribution patterns

Most available research in detecting educational leadership styles and leadership efficacy involves principals' education as an important indicator (Bryk & Driscoll, 1988; Heck & Marcoulides, 1990; Smith et al., 1992). This study also finds schools' distributed leadership patterns vary as indicated by principals' educational background. The educational background variable is a ordinal variable with four scales of the principal's degree ranked from Lower than Associate (1), Associate (2), Bachelor's (3) to Master's (4). So the Kruskal Wallis test was used for this analysis. The Kruskal Wallis test is appropriate when the analysis has the independent variable with two or more levels and an ordinal dependent variable. In other words, it is the nonparametric version of ANOVA (UCLA)

Among five interested leadership functions, four have been found that there is statistically significant difference for principal groups with different degrees when they adopting different leadership distribution patterns. Because there are four scales for the dependent variable, it is inevitable that some of the scores receive tied ranks and this is found in the analysis because Chi-square with ties is very different from the unadjusted chi-square, so the Chi-square with a correction factor was used for the final interpretation.

For setting the school direction, principal with higher degrees are more likely to proactively take over the responsibility because more schools that have patterns as either 2 or 4 demonstrate to have higher degree ranking sum, which means these schools have principal with

higher degrees. For developing people, more schools with educated principals have demonstrated the distributed leadership pattern as 4 (Collective Network) or 2 (Hierarchical Coordination), in which formal leaders take the roles constantly, and informal leaders' role vary from school to school. However, for hiring, the schools with principals of higher degrees tend to exclude informal leaders in making the decision. Schools with principal of higher degree exhibit the patterns of either 1 or 2. Both of these patterns have less informal leaders' participation though the formal leaders' role vary from schools to schools. Finally, there is significantly difference found among principals of varied levels of degree in setting salary scale. A majority of schools reveal to have Patten 1, but the principal's averaged degree in this group is not as high as the schools that have formal leaders set the school salaries. I also found the principal with higher degrees tend to be more proactive in making the decision on school incentive structure and salary scales because 1/3 of schools also reveal to have Pattern 2. In addition, though there are only a very small number of the schools have only informal leaders made the decision on salary, the principals in these schools have the highest degree in average. Interestingly, there is no statistically significant difference found for the principal's degrees when adopting different distributed leadership patterns for managing instruction.

| Variable ^C | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|----------------|----------------|---------------|----------------|
| Setting | 2.984** (1200) | 3.005***(2546) | 2.977***(598) | 2.981***(1747) |
| Direction | | | | |
| Developing | 2.974**(1612) | 3.004** (1390) | 2.978**(1113) | 3.003** (1982) |
| People | | | | |
| Managing | 2.980 (2096) | 2.982 (941) | 2.994 (879) | 3.004 (2179) |
| Instruction | | | | |
| Hiring | 2.987***(2332) | 3.012***(2406) | 2.935***(294) | 2.967***(1059) |
| Salary Setting | 2.984**(3977) | 3.007**(1878) | 3.080**(25) | 2.962**(211) |

Table 17: Principals' Education and Distributed Leadership Pattern

*P<0.05; **P<0.01; ***P<0.001

C: Kruskal-Wallis equality-of-populations rank test

Parameter is the Mean, observation number in the parentheses

Principal's experience as a principal and school leadership distribution patterns

The next emphasis is the impact of principals' experience on the leadership distribution patterns. First of all, I did the data distribution examination and found though the principal's experience as principal is a continuous variable but it is not normally distributed (as indicated in the figure below), most principals have less than 15-year experience. Therefore, one-way ANOVA with normality assumption does not work for this analysis. The Kruskal Wallis is more appropriate because the Kruskal Wallis test does not assume normality of data for dependent variable and works for independent variable with more than two levels (UCLA)



Figure 19: The Data Distribution for the Principal's Experience as A Principal

The results are interesting as the principal's experience as a principal demonstrates to be a very important indicator of what kind of distributed leadership pattern a principal is most likely to adopt. There is statistical significant variance found for principals with different years of experience in terms of adopting distributed leadership pattern.

First of all, for setting the school direction, more than 1/3 of the schools have the pattern of 2 that only formal principals are involved in setting the direction for the school, and these schools have more experienced principals as demonstrated by the ranking sum. This is followed

by pattern 4 with about 1/4 schools (1646) that also have more experienced principals. For the leadership functions of developing people and managing instruction, the school distribution is polarized that more schools either have Pattern 4 that both formal leaders and informal leaders are involved or Pattern 1 that both groups do not participate in the leading role. This is very interesting as both developing people and managing instruction are the most important schools functions and the result shows there is big variation among schools on how these roles are fulfilled, especially when considering the principal's experience as an indicator.

| Variable ^C | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|-----------------|-----------------|----------------|-----------------|
| Setting | 7.378*** (1082) | 9.108***(2456) | 7.800***(551) | 9.162***(1646) |
| Direction | | | | |
| Developing | 8.654***(1541) | 9.202*** (1316) | 7.907***(1020) | 8.729*** (1858) |
| People | | | | |
| Managing | 8.011*** (1931) | 8.521*** (883) | 8.733*** (829) | 9.319*** (2092) |
| Instruction | | | | |
| Hiring | 7.388***(2143) | 9.794***(2322) | 7.729***(269) | 9.067***(1001) |
| Salary Setting | 7.844***(3704) | 10.217***(1824) | 10.190***(21) | 9.823***(186) |

Table 18: Principals' Experience as a Principal and Distributed Leadership Pattern

*P<0.05; **P<0.01; ***P<0.001

C: Kruskal-Wallis equality-of-populations rank test

Parameter is the Mean, observation number in the parentheses

For hiring the setting the salary, both have more schools with distributed leadership Patterns 1 or 2 that informal leaders are not included. If hiring still have about 1/6 schools demonstrated to adopt pattern 4 that both formal and informal leaders make the decision in hiring, setting salary function basically excludes informal leaders in most schools. However, one nuance here is for hiring and setting salary, more experienced principals still tend to be involved more than less experienced principals as Pattern 2 have higher ranking sum than Pattern 1 when average the schools. The characteristic of principal experience as a principal is undoubtedly the most important indicator in predicting school distributed leadership patterns. One essential finding is that more experienced principals are applying the pattern of Collective Network (4) in their schools for managing instruction and developing people, in which both the formal leaders and informal leaders take important responsibilities.

How Schools' Contextual Factors Including Management type, Public funding, Size and Low SES vary as categorized by Different Distributed Leadership Patterns

The schools' contextual conditions (Bryk & Driscoll, 1988; Edwards, 2011; Zheng, 1996) including management type (Allison, 1986; Bryk, 1984; Murphy, 2008; Williamson, 2011), student composition (Bryk et al., 1988), and school size (Goldberg, 2002) have been interested by the researcher to explore their association with different leadership styles in the school. Some other researchers are interested in the cross-national study of the cultural impact on different leadership styles as Hofstede (1984) research provided such cultural emphasis. The work of Den Hartog et al. (1999) further explained:

"In some [national] cultures one might need to take strong decisive action in order to be seen as a leader, whereas in other cultures consultation and a democratic approach may be a prerequisite" (p. 225)

The research available for the contextual connection with distributed leadership investigates the relationship between particular leadership and the community, and argues it is necessary to understand distributed leadership within organizational and cultural context (Edwards, 2011), and within different level of education (Heikka, Waniganayake, & Hujala, 2013). From the work of Spillane and Diamond (2007), it is important to be aware that distributed leadership is a function and dynamic process between leaders, subordinates and their situations, as opposed to an relationship merely between leaders and followers. They argue that distributed leadership is heavily influenced by organizational structures and contextual settings. Available research, largely theory-oriented, forms the foundation for the current study to explore

empirical evidence on how different leadership distribution patterns are favorable by schools within varied contextual settings.

School management type and school leadership distribution patterns

When the interest is directed to the school management type as whether it is publicly or privately managed, the research done by Murphy (2008) provided evidence that there is different emphasis and strategies for leaders at different sites. In this study, the school management type is defined as either public or private so the variable is binary. Chi-square test was used for the analysis.

| Variable ^A | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|-----------------|----------------|----------------|-----------------|
| Setting | 0.972*** (1218) | 0.820***(2557) | 0.831***(602) | 0.841***(1739) |
| Direction | | | | |
| Developing | 0.873 (1624) | 0.851 (1390) | 0.859 (1117) | 0.848 (1985) |
| People | | | | |
| Managing | 0.911*** (2118) | 0.762*** (947) | 0.907*** (882) | 0.827*** (2169) |
| Instruction | | | | |
| Hiring | 0.960***(2364) | 0.814***(2412) | 0.795***(297) | 0.744***(1043) |
| Salary Setting | 0.923***(4009) | 0.725***(1887) | 0.760***(25) | 0.800***(195) |

Table 19: School Management Type and Distributed Leadership Pattern

*P<0.05; **P<0.01; ***P<0.001

Parameter is the Mean, observation number in the parentheses

In general, the data set include more public schools than the private schools, and there is statistically significant variation between public and private schools for leadership distribution patterns in four leadership functions.

For both public schools and private schools, more schools adopt leadership pattern 2 and 4 that have formal leaders' participation in general but varied level of informal leaders' involvement in setting the school direction. Private schools have more sharing that have formal leaders (Pattern 2) or both groups (Pattern 4) to decide their schools direction verse their public peers.

A: Chi-square test

For managing instruction, both public and private schools have a large proportion of schools adopted leadership Pattern 4 that involves both formal and informal leaders in these responsibilities. Public schools have larger proportion of schools than the private schools to be associated with Pattern 1 that their school leaders are not paying attention to school instructional issues. For hiring, more private schools demonstrate to have either informal leaders (Pattern 2) or both groups be involved in hiring, but public schools demonstrate to have more schools associated with Pattern 2 or even Pattern 1 that the hiring responsibility fall out of the school.

For the last leadership role of setting the salary, a majority of public schools do not have the school power for the salary and incentive structure, compare to their private counterparts who have more schools to have the formal leaders made the decision (Pattern 2).

School funding resource and school leadership distribution patterns

When contextualizing distributed leadership pattern in schools with varied level of public funding, I also used chi-square test because the variable for public funding is a binary variable asking whether the school gets more than 50% of the funding from the government. There is statistically significant difference found for the schools with less or more than 50% of public funding as grouped by the 4 different leadership distribution patterns for all five school leadership responsibilities.

First of all, around 40% of schools with or without 50% public funding demonstrate to have formal leaders in setting the school's direction. While schools receiving more than 50% of public funding reveal to have more schools that have both formal and informal leaders involved in setting the direction than the schools with less than 50% of public funding. For developing people, though about 32% of schools demonstrate to have Pattern 4, the gap between the schools with varied public funding is not obvious. The difference was revealed in Pattern 1 that schools

with more than 50% of public funding show to have more schools in this category than the schools with less than 50% of public funding. More schools with less than 50% of public funding seem to have either formal leaders (25.19%) or informal leaders (20.30%) to be involved in developing people than the schools with more than 50% of public funding (22.32% and 17.95%) (Refer to <u>Appendix E</u> for the proportion figure)

| Variable ^A | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|-----------------|----------------|----------------|-----------------|
| Setting | 0.858** (1213) | 0.873**(2549) | 0.830**(602) | 0.884**(1733) |
| Direction | | | | |
| Developing | 0.887* (1621) | 0.855* (1384) | 0.854* (1113) | 0.873* (1979) |
| People | | | | |
| Managing | 0.873*** (2110) | 0.827*** (943) | 0.899*** (879) | 0.871*** (2165) |
| Instruction | | | | |
| Hiring | 0.896***(2358) | 0.851***(2404) | 0.835***(297) | 0.861***(1038) |
| Salary Setting | 0.890***(4003) | 0.831***(1877) | 0.800***(25) | 0.807***(192) |

Table 20: School Public Funding and Distributed Leadership Pattern

*P<0.05; **P<0.01; ***P<0.001

A: Chi-square test

Parameter is the Mean, observation number in the parentheses

For Managing Instruction, schools are polarized that either have both groups participated in managing instruction or neither of them are involved no matter whether the school receives 50% of funding from the government or nor. For hiring, the schools receive less public funding demonstrate to have more autonomy in making hiring decision by either formal leaders (44.99%) or both groups (18.05%), the schools receive more than 50% of public funding have more schools fall in Pattern 1 (39.86%) that their school hiring is not the school autonomy or maybe only the formal leaders' authority (38.59%). The last school leadership responsibility, setting the salary scales, as always, is only the responsibility of either formal leaders in the school or external authority for all schools. But schools with more public funding have less autonomy than the schools receiving less public funding. 67.26 percent of the publicly-funded schools fall in Pattern 1 compared to 55.01% for schools with less public funding. On the other hand, 39.72% of schools with less than 50% of public funding fall in Pattern 2 that school formal leaders make the decision for salary, but only 29.44% of publicly-funded schools are in this group.

School size and school leadership distribution patterns

Available research explores school size as the important indicator for school leadership style and effect though the finding is not consistent (Hallinger et al., 1996; Smith et al., 1992; Zheng, 1996). This current research is interested in adding nuance to whether school size is an indicator of schools' leadership distribution patterns. Because school size is a continuous variable and the distribution is relatively normal. A one-way ANOVA was used for the analysis. Table 21: School Size and Distributed Leadership Pattern

| Variable ^B | Pattern #1 | Pattern #2 | Pattern #3 | Pattern #4 |
|-----------------------|------------------|----------------|-----------------|----------------|
| Setting | 688.94*** (1201) | 615.58***(2538 | 728.65(589) | 673.68**(1697) |
| Direction | |) | | |
| Developing | 499.77*** (1602) | 658.56* (1376) | 699.18* (1101) | 765.09* (1922) |
| People | | | | |
| Managing | 696.18*** (2079) | 647.47*** | 632.41*** (872) | 634.69*** |
| Instruction | | (936) | | (2117) |
| Hiring | 736.99*** (2322) | 576.07***(2394 | 633.35***(292) | 675.39***(997) |
| | |) | | |
| Salary Setting | 705.75*** (3952) | 563.02***(1873 | 620.75***(24) | 578.01***(156) |
| | |) | | |

*P<0.05; **P<0.01; ***P<0.001

B: One-way ANOVA

Parameter is the Mean, observation number in the parentheses

The result indicates that there is significant variance of distributed leadership patterns for all leadership functions regarding school size. In general, larger schools tend to have informal leaders involved in setting the school direction (Pattern 3). In addition, larger schools have both principals and teachers participated in developing people (Pattern 4 or Pattern 3), and small schools tend to leave this function unconcerned or leave it for outside authority to take care (Pattern 1). For three of the leadership roles as managing instruction, hiring people and setting salary scales, larger schools tent to lose the power to outside authorities (Pattern 1), instead, small schools have either formal or informal leaders' contribution to these leadership functions.

School proportion of low SES students and school leadership distribution patterns

The last school contextual factor analyzed in this study was schools' proportion of low socioeconomic students. The question asked the proportion of low SES students in the school with 5 scales ranging from none (1), 1-10% (2), 10-30% (3), 30-60% (4) to more than 60% (5). The variable is an ordinal variable so the Kruskal-Wallis test was used.

From the analysis, it is obvious that schools differ significantly from each other when adopting leadership patterns as indicated by the proportion of low-SES students. In general, the more Low-SES students the school has, the less involvement of both formal and informal leaders in the school leadership responsibilities.

For setting the direction, about 37 percent of schools that have larger than 60% of Low SES student have not observed both the formal leader and informal leaders in this role, and the school proportion in Pattern 1 increases along with the school proportion of low SES students. On the other hand, the proportion of schools declines in Pattern 2 and Pattern 4 when the proportion of low SES student's proportion increases. This observation also applies to the leadership function of managing instruction that the school proportion of Pattern 1 increases and the Pattern 4 decreases when the proportion of low SES students increase, but when the percentage of low SES students reaches over 60%, the schools restarts to include more formal and informal leaders to making the decision on school instructional issues. The exception is for developing people that there reveals a negative correlation between informal leaders' participation in people development and the proportion of low-income student. In another word, the proportion of schools adopting Pattern 3 or 4 with informal leaders' active participation increases when the school number of low-income students increases.

| С | | S | Setting I | Directio | n | | | D | evelopi | ng Peop | le | |
|-----|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| DL | None | 1% to | 11% | 31% | > | Total | None | 1% | 11% | 31% | > | Total |
| | | 10 | to 30 | to 60 | 60% | | | to 10 | to 30 | to 60 | 60% | |
| 1 | 56 | 351 | 341 | 245 | 214 | 1,207 | 118 | 608 | 486 | 256 | 142 | 1,610 |
| % | <mark>12.70</mark> | <mark>15.88</mark> | 18.49 | <mark>25.63</mark> | <mark>36.83</mark> | 20.01 | 26.76 | 27.51 | 26.36 | 26.78 | 24.44 | 26.69 |
| 2 | 250 | 1,029 | 773 | 316 | 158 | 2,526 | 125 | 543 | 388 | 195 | 129 | 1,380 |
| % | <mark>56.69</mark> | <mark>46.56</mark> | <mark>41.92</mark> | <mark>33.05</mark> | <mark>27.19</mark> | <mark>41.88</mark> | <mark>28.34</mark> | <mark>24.57</mark> | <mark>21.04</mark> | <mark>20.40</mark> | <mark>22.20</mark> | <mark>22.88</mark> |
| 3 | 38 | 155 | 189 | 140 | 75 | 597 | 63 | 376 | 346 | 206 | 111 | 1,102 |
| % | 8.62 | 7.01 | 10.25 | 14.64 | 12.91 | 9.90 | <mark>14.29</mark> | <mark>17.01</mark> | <mark>18.76</mark> | <mark>21.55</mark> | <mark>19.10</mark> | <mark>18.27</mark> |
| 4 | 97 | 675 | 541 | 255 | 134 | 1,702 | 135 | 683 | 624 | 299 | 199 | 1,940 |
| % | <mark>22.00</mark> | <mark>30.54</mark> | <mark>29.34</mark> | <mark>26.67</mark> | <mark>23.06</mark> | <mark>28.22</mark> | <mark>30.61</mark> | <mark>30.90</mark> | <mark>33.84</mark> | <mark>31.28</mark> | <mark>34.25</mark> | <mark>32.16</mark> |
| Ch2 | | | 276.34 | 42*** | | | | | 31.5 | 56** | | |
| | | Ma | naging | Instruct | tion | | | | Hiring | People | | |
| DL | None | 1% to | 11% | 31% | > | Total | None | 1% | 11% | 31% | > | Total |
| | | 10 | to 30 | to 60 | 60% | | | to 10 | to 30 | to 60 | 60% | |
| 1 | 674 | 621 | 419 | 261 | 2,089 | 674 | 102 | 712 | 714 | 471 | 340 | 2,339 |
| % | <mark>30.50</mark> | <mark>33.68</mark> | <mark>43.83</mark> | <mark>44.92</mark> | <mark>34.63</mark> | <mark>30.50</mark> | <mark>23.13</mark> | <mark>32.22</mark> | <mark>38.72</mark> | <mark>49.27</mark> | <mark>58.52</mark> | <mark>38.78</mark> |
| 2 | 318 | 306 | 136 | 82 | 939 | 318 | 253 | 978 | 719 | 304 | 134 | 2,388 |
| % | 14.39 | 16.59 | 14.23 | 14.11 | 15.57 | 14.39 | <mark>57.37</mark> | <mark>44.25</mark> | <mark>38.99</mark> | <mark>31.80</mark> | <mark>23.06</mark> | <mark>39.59</mark> |
| 3 | 361 | 274 | 116 | 75 | 875 | 361 | 18 | 94 | 88 | 58 | 36 | 294 |
| % | 16.33 | 14.86 | 12.13 | 12.91 | 14.51 | 16.33 | 4.08 | 4.25 | 4.77 | 6.07 | 6.20 | 4.87 |
| 4 | 857 | 643 | 285 | 163 | 2,129 | 857 | 68 | 426 | 323 | 123 | 71 | 1,011 |
| % | <mark>38.78</mark> | <mark>34.87</mark> | <mark>29.81</mark> | <mark>28.06</mark> | <mark>35.30</mark> | <mark>38.78</mark> | 15.42 | 19.28 | 17.52 | 12.87 | 12.22 | 16.76 |
| Ch2 | | | 121.2 | 25*** | | | | | 272.6 | 39*** | | |
| | | Set | tting Sal | lary Sca | les | | | | | | | |
| DL | None | 1% to | 11% | 31% | > | Total | | | | | | |
| | | 10 | to 30 | to 60 | 60% | | | | | | | |
| 1 | 175 | 1,312 | 1,249 | 751 | 476 | 3,963 | | | | | | |
| % | <mark>39.68</mark> | <mark>59.37</mark> | <mark>67.73</mark> | <mark>78.56</mark> | <mark>81.93</mark> | <mark>65.70</mark> | | | | | | |
| 2 | 250 | 823 | 542 | 172 | 84 | 1,871 | | | | | | |
| % | <mark>56.69</mark> | <mark>37.24</mark> | <mark>29.39</mark> | <mark>17.99</mark> | <mark>14.46</mark> | <mark>31.02</mark> | | | | | | |
| 3 | 0 | 7 | 7 | 9 | 1 | 24 | | | | | | |
| % | 0.00 | 0.32 | 0.38 | 0.94 | 0.17 | 0.40 | | | | | | |
| 4 | 16 | 68 | 46 | 24 | 20 | 174 | | | | | | |
| % | 3.63 | 3.08 | 2.49 | 2.51 | 3.44 | 2.88 | | | | | | |
| Ch2 | | | 374.1 | 15*** | | | | | | | | |

Table 22: The Percentage of School Low SES Students and Distributed Leadership Pattern

C: Kruskal-Wallis equality-of-populations rank test (*** P<0.001, **P<0.01)

For hiring and setting the salary scales, when the school proportion of low income students increase, they are more likely to leave the hiring to outside authority, even the proportion of schools with formal leaders' participation in hiring decision declines when they have increasing poverty students.

Findings for Research Question 3: The Correlation between Contribution of Formal and Informal Leaders to Each Leadership Role and Teaching Quality

As indicated in the research design chapter, a two-level Hierarchical Linear Model (HLM) was used for the third question in this study for each country using Stata 14 software that can handle the multi-level model with complex data well. When fitting the HLM model, I applied weights in the model. OECD calculated sample weights to compensate unequal selection probability because of the two-sage cluster sampling method, and varied response rate from country to country (OECD, 2014). So the weight was calculated through two stage, the first step was to calculate the base weight based on the probability of being selected within the cluster, and the population. Then an adjustment was applied based on the country's response rate. The Hierarchical Linear Models were fitted separately for informal leaders' role and formal leaders' role and formal leaders' role and hiring is correlated. To avoid the analysis basis or collinearity issue in regression model, the formal group and informal groups are separated in two models when fitting HLM for individual country.

After getting the HLM results for each of 32 countries, I did a meta-analysis to synthesize the coefficient effect generated from each country to detect the correlation between the variables of interest using fixed effect.

Given that teacher quality is most likely endogenous to individual country's context, that is, teacher's teaching quality could be correlated with particular cultural, social and political contexts that are unique for each country (Den Hartog et al., 1999), the comparative study generally has included country-level variables as either random effect by adding a country level random effect in a multi-level model, or including country dummy variables as fixed effect of

country variance. TALIS data does not include the explicitly quantified distinctions at country level, therefore, many researchers used country fixed effects or a dummy variable in order to account for the variations in dependent variables that are related to the countries' unobserved factors in their model (Chudgar et al., 2013; Zhou, 2014).

This research acknowledges the country-level uniqueness regarding their country contextual condition and education policy, culture and belief, which should account for teaching quality and many practices within the country boundary (Hofstede, 1984; Hoppe, 2004). Therefore, this study first fit the Hierarchical Linear Model for each individual country, then I conduct a meta-analysis synthesizing findings of the coefficient effect for individual countries regarding how the extent of formal and informal leaders' participation in leadership responsibilities impact the teaching quality.

Formal Leaders' Leading Role and Teaching Quality

The findings start from the results for 32 individual countries (<u>Appendix F</u>). The results of the Hierarchical Linear Regression Model did not reveal consistent findings across countries for the effect of formal leaders' participation in each of five leadership responsibilities on the teaching quality.

| | AAD | AUS | BFL | BGR | BRA | CAB | CHL | CZE |
|---------|---------|---------|---------|---------|---------|---------|---------------------|---------|
| Ν | 1582 | 1507 | 2270 | 1915 | 5492 | 1340 | 716 | 3020 |
| DEVPEO | -0.014 | -0.141 | -0.075 | 0.003 | 0.006 | 0.094 | -0.171 | 0.059 |
| | (0.071) | (0.074) | (0.065) | (0.097) | (0.046) | (0.073) | (0.144) | (0.057) |
| HIR_FOR | -0.145 | -0.123 | 0.015 | 0.193 | 0.052 | -0.001 | -0.142 | 0.014 |
| | (0.123) | (0.163) | (0.079) | (0.257) | (0.077) | (0.115) | (0.128) | (0.080) |
| MAGINS | 0.040 | 0.006 | -0.100 | -0.011 | 0.004 | 0.078 | <mark>0.285*</mark> | -0.039 |
| | (0.079) | (0.108) | (0.069) | (0.072) | (0.056) | (0.107) | (0.116) | (0.063) |
| SETDIR | -0.038 | 0.230 | -0.027 | -0.083 | -0.093 | -0.052 | -0.225 | 0.061 |
| | (0.113) | (0.119) | (0.072) | (0.128) | (0.064) | (0.110) | (0.241) | (0.104) |
| SALARY | 0.225 | -0.210 | -0.175 | -0.238 | -0.051 | 1.024 | 0.232 | 0.079 |

Table 23: Formal Leaders' Impact on Teaching Quality across 32 Countries

| Table 23 (c | ont'd) | | | | | | | |
|-------------|---------------------|----------------------|----------------------|---------------------|-----------------------|-------------------------|---------------------|------------------------|
| | (0.187) | (0.185) | (0.115) | (0.133) | (0.176) |) (0.568) | (0.232) | (0.137) |
| | DNK | ENG | ESP | EST | FIN | FRA | HRV | ISR |
| Ν | 1122 | 2149 | 1983 | 2822 | 1900 | 2308 | 2392 | 2641 |
| DEVPEO | 0.024 | -0.035 | 0.013 | 0.008 | -0.006 | -0.091 | -0.001 | 0.122 |
| | (0.068) | (0.097) | (0.069) | (0.052) | (0.092) |) (0.075) | (0.045) | (0.076) |
| HIR_FOR | -0.062 | 0.018 | -0.015 | 0.076 | 0.197 | -0.010 | 0.128 | <mark>-0.352***</mark> |
| | (0.094) | (0.143) | (0.077) | (0.085) | (0.136) |) (0.108) | (0.078) | (0.087) |
| MAGINS | -0.092 | 0.148 | -0.000 | -0.010 | -0.126 | -0.011 | 0.031 | <mark>0.171*</mark> |
| | (0.087) | (0.082) | (0.061) | (0.058) | (0.093) |) (0.065) | (0.050) | (0.074) |
| SETDIR | <mark>0.264*</mark> | 0.176 | -0.108 | 0.086 | 0.035 | 0.006 | -0.012 | -0.027 |
| | (0.114) | (0.121) | (0.073) | (0.102) | (0.140) |) (0.059) | (0.066) | (0.083) |
| SALARY | 0.030 | -0.131 | -0.010 | -0.134 | -0.015 | 0.238 | 0.105 | 0.074 |
| | (0.079) | (0.137) | (0.105) | (0.108) | (0.142) |) (0.302) | (0.164) | (0.132) |
| | ITA | JPN | KOR | LVA | MEX | MYS | NLD | NOR |
| Ν | 882 | 3153 | 2383 | 1776 | 1867 | 2543 | 1593 | 1752 |
| DEVPEO | 0.017 | -0.042 | -0.035 | 0.018 | <mark>-0.176</mark> * | <mark>*</mark> 0.017 | - | <mark>0.280**</mark> |
| | | | | | | | <mark>0.211*</mark> | |
| | (0.115) | (0.051) | (0.063) | (0.129) | (0.073) |) (0.075) | (0.106) | (0.094) |
| HIR_FOR | -0.133 | -0.093 | 0.205 | -0.096 | 0.035 | -0.198 | -0.067 | <mark>0.295*</mark> |
| | (0.136) | (0.105) | (0.119) | (0.075) | (0.144) |) (0.245) | (0.081) | (0.144) |
| MAGINS | 0.049 | 0.072 | 0.075 | 0.056 | 0.121 | 0.109 | 0.031 | <mark>-0.195*</mark> |
| | (0.089) | (0.059) | (0.111) | (0.068) | (0.082) |) (0.069) | (0.085) | (0.080) |
| SETDIR | 0.030 | -0.044 | -0.011 | <mark>0.163*</mark> | -0.061 | -0.002 | 0.126 | -0.099 |
| | (0.137) | (0.073) | (0.150) | (0.082) | (0.114) |) (0.074) | (0.108) | (0.137) |
| SALARY | 0.192 | 0.184 | <mark>-0.566*</mark> | -0.083 | 0.093 | 0.058 | -0.076 | -0.110 |
| | (0.263) | (0.116) | (0.277) | (0.089) | (0.182) |) (0.154) | (0.123) | (0.215) |
| | POL | PRT | ROU | SGP | SRB | SVK | SWE | USA |
| N | 3168 | 2636 | 3067 | 2646 | 2442 | 3055 | 2680 | 1526 |
| DEVPEO | 0.018 | <mark>0.099**</mark> | -0.012 | 0.006 | 0.015 | -0.014 <mark>0.2</mark> | 29*** | 0.157 |
| | (0.058) | (0.038) | (0.063) | (0.096) | (0.079) | (0.064) (0. | 053) | (0.098) |
| HIR_FOR | -0.039 | 0.010 | -0.076 | -0.053 | 0.040 | 0.040 -0. | 087 | 0.060 |
| | (0.172) | (0.059) | (0.081) | (0.068) | (0.087) | (0.067) (0. | 163) | (0.113) |
| MAGINS | <mark>0.142*</mark> | | -0.003 | -0.048 | 0.058 | -0.061 -0. | 127 | 0.021 |
| | | 0.135** | | | | | 0.00 | |
| | (0.070) | (0.052) | (0.056) | (0.078) | (0.077) | (0.059) (0. | 069) | (0.072) |
| SETDIR | -0.062 | 0.118* | -0.072 | -0.098 | -0.062 | -0.008 0.1 | .63 | 0.118 |
| | (0.102) | (0.058) | (0.100) | (0.117) | (0.084) | (0.090) (0. | 131) | (0.129) |
| SALARY | -0.129 | 0.054 | -0.168 | 0.023 | -0.066 | 0.004 -0. | 099 | -0.300 |
| | (0.088) | (0.076) | (0.159) | (0.122) | (0.109) |) (0.097) | (0.152) | (0.348) |

For the correlation between formal leaders' participation in making school decisions and teaching quality. Norway (β =0.280, P<0.01), Portugal (β =0.099, P<0.01) and Sweden (β =0.229, P<0.01) have been found that their formal leaders' participation in developing people has a positive impact on teaching quality. While formal leaders' involvement of developing people in Netherland (β = -0.211, P<0.05) and Mexico (β = -0.176, P<0.05) is negatively associated with teaching quality in their countries.

For hiring people, the countries that have significant relationship between formal leaders' participation in the process, and teaching quality are Israel (β =-0.352, P<0.001) and Norway (β =0.295, P<0.05). But the effect in Israel is opposite to the effect in Norway, which reveals that it is essential for principals in Norway to participate proactively in the hiring of staff to secure the quality of teachers, the principals in Israel are playing a negative role in teacher's teaching quality when they make the decision of hiring.

The third leadership function emphasized in this study is the most important leadership function in the school as managing the instruction. The responsibilities for instruction-related issues include the school decision on which courses to offer, what materials to use, what content to teach and other student admission and assessment decisions. Researchers (Hallinger, 2005; Printy, 2010) argue instructional leaders play essential roles in making decision regarding instruction, creating a supportive school climate for learning and devoting to mobilizing schools towards instructional effectiveness. Therefore, I have strong interest to investigate whether and to what extent formal leaders' active role in managing instruction will be beneficial for school human capital. For the leadership responsibility of managing the instruction, I found significant correlation between formal leaders' crucial role in predicting teaching quality in several countries, these are Chile (β =0.285, P<0.05), Israel (β =0.171, P<0.05) and Poland (β =0.142,

P<0.05), while a significantly negative correlation is also found for Norway (β =-0.195, P<0.05) and Portugal (β = -0.135, P<0.05) where formal leaders' active participation for managing instruction is not helpful for maintaining a strong team of teachers with high quality of teaching.

For the leadership role of setting the school direction, which is essential for the school to establish the priority and the school vision, Denmark (β =0.264, P<0.05), Latvia (β =0.163, P<0.05) and Portugal (β =0.118, P<0.05) have been found that their formal leaders' leading role in setting the school direction is positively related to the school teachers' teaching quality. For this leadership function of setting the school direction, there is no single country that has been revealed to have negative correlation between formal leaders' decision making and teachers' teaching quality.

The last leadership role in this research is setting the school salary scales and the results indicated that only Korea (β = -0.566, P<0.05) has been found to exist a negative correlation between formal leaders' decisive role of setting school salary scales and teachers' teaching quality.

Informal Leaders Leading Role and Teaching Quality

In a school setting, not only formal leaders play the essential role in making the school decision and leading, informal leaders like teachers, governing board or even students may also play crucial roles in many school leadership functions (Barth, 2001; Harris & Muijs, 2005; Leithwood & Seashore-Louis, 2011). Leithwood and his colleagues (2007), through a qualitative study, found that teachers possessing organizational features play at least three of four important leadership functions in the school as developing people, designing organization, and instructional management. The available research forms the foundation for my study to investigate to what extent the informal leader participates in school leadership roles and how the involvement in

school decision making might impact teachers in the school.

| | AAD | AUS | BFL | BGR | BRA | CAB | CHL | CZE |
|-----------|---------|-----------------------------|--------------------|----------------------------|----------------------|-----------------------|----------------------|----------------------|
| N | 1558 | 1491 | 2257 | 1909 | 5459 | 1331 | 701 | 3016 |
| DEVPEO | 0.078 | -0.012 | -0.118 | 0.070 | <mark>0.094*</mark> | 0.016 | -0.234 | -0.012 |
| | (0.057) | (0.084) | (0.067) | (0.068) | (0.040) | (0.105) | (0.137) | (0.073) |
| HIR_INF | 0.315 | -0.170 | 0.049 | -0.081 | <mark>0.266*</mark> | 0.082 | <mark>0.929**</mark> | -0.090 |
| | (0.210) | (0.146) | (0.115) | (0.082) | (0.123) | (0.113) | (0.325) | (0.128) |
| MAGINS | -0.102 | -0.080 | -0.049 | 0.042 | -0.063 | 0.091 | -0.034 | 0.006 |
| | (0.068) | (0.082) | (0.060) | (0.084) | (0.045) | (0.074) | (0.107) | (0.049) |
| SETDIR | 0.023 | 0.062 | -0.090 | <mark>-0.250**</mark> | <mark>-0.160*</mark> | <mark>-0.300*</mark> | <mark>-0.672*</mark> | 0.131 |
| | (0.208) | (0.137) | (0.120) | (0.095) | (0.074) | (0.119) | (0.264) | (0.074) |
| SALARY | -0.361 | 0.000 | 0.000 | -0.031 | 0.152 | 0.110 | 0.000 | 0.000 |
| | (0.222) | (.) | (.) | (0.095) | (0.177) | (0.344) | (.) | (.) |
| | DNK | ENG | ESP | EST | FIN | FRA | HRV | ISR |
| Ν | 1117 | 2131 | 1976 | 2807 | 1897 | 2281 | 2381 | 2614 |
| DEVPEO | | -0.088 | -0.056 | -0.048 | -0.327 | -0.028 | -0.004 | <mark>0.216**</mark> |
| | 0.176* | (0, 070) | (0, 001) | (0.0(5)) | (0, 262) | (0.092) | (0,0,0,0) | (0.071) |
| LIID INIT | (0.0/2) | (0.0/0) | (0.091) 0.170 | (0.005) | (0.263) | (U.U83) 0.270* | (0.060) | (0.0/1) |
| TIK_INF | -0.013 | -0.101 | (0.1/0) | (0.043) | (0.252) | 0.379 ^{**} | -0.021 | (0,004) |
| MACINIC | (0.053) | (0.108) | (0.108) | (U.U0U) 0.11 <u>6**</u> | (0.255) | (0.1/1) | (0.059) | (0.094) |
| MAGINS | -0.008 | (0.060) | -0.149* (0.066) | (0.0110^{***}) | -0.014 | -0.040 | (0.050) | -0.098 |
| CETDID | (0.007) | (U.U09 <i>)</i> 0 516*** | (0.000) | (0.044) 0.026 | (0.080) | (0.004) | (0.039) | (0.009) |
| SEIDIK | (0.020) | (0.155) | -0.0/0 | (0.020 | -0.043 | (0.005) | -0.028 | -0.041 |
| SALADV | (0.001) | (0.133) | (0.108) | (0.089) | (0.121) | (0.093) | (0.090) 0.000 | (0.112) |
| SALAK I | -0.122 | -0.079 | 0.000 | 0.018 | - 0 430** | 0.000 | 0.000 | - 0 512*** |
| | (0.091) | (0.111) | (.) | (0.098) | (0.143) | (.) | (.) | (0.112) |
| | ITA | JPN | KOR | LVA | MEX | MYS | NLD | NOR |
| N | 880 | 3139 | 2371 | 1768 | 1865 | 2531 | 1564 | 1740 |
| DEVPEO | 0.047 | 0.031 | -0.148 | 0.051 | -0.050 | 0.040 | 0.023 | 0.284 |
| | (0.149) | (0.049) | (0.098) | (0.097) | (0.077) | (0.061) | (0.096) | (0.227) |
| HIR_INF | 0.000 | 0.179 | 0.224 | 0.070 | 0.317 | -0.260 | 0.133 | 0.045 |
| | (.) | (0.158) | (0.241) | (0.074) | (0.168) | (0.308) | (0.085) | (0.131) |
| MAGINS | 0.098 | -0.003 | 0.089 | 0.075 | -0.069 | 0.091 | 0.038 | 0.064 |
| | (0.110) | (0.052) | (0.083) | (0.074) | (0.069) | (0.090) | (0.089) | (0.121) |
| SETDIR | -0.064 | 0.052 | 0.025 | -0.136 | 0.076 | -0.041 | -0.092 | <mark>-0.394*</mark> |
| | (0.095) | (0.106) | (0.116) | (0.102) | (0.126) | (0.117) | (0.149) | (0.182) |
| SALARY | 0.000 | 0.000 | 0.452 | -0.031 | 0.000 | <mark>0.702***</mark> | 0.000 | 0.266 |
| | (.) | (.) | (0.268) | (0.080) | (.) | (0.185) | (.) | (0.146) |

Table 24: Informal Leaders' Impact on Teaching Quality across 32 Countries

| | POL | PRT | ROU | SGP | SRB | SVK | SWE | USA |
|---------|---------|----------------------|---------------------|---------|---------|---------|----------------------|----------------------|
| Ν | 3158 | 2621 | 3053 | 2641 | 2429 | 3048 | 2660 | 1519 |
| DEVPEO | -0.055 | -0.024 | 0.055 | -0.084 | 0.063 | 0.068 | -0.053 | <mark>0.331**</mark> |
| | (0.057) | (0.040) | (0.062) | (0.052) | (0.066) | (0.059) | (0.066) | (0.120) |
| HIR_INF | -0.046 | 0.131 | 0.132 | -0.169 | -0.003 | -0.038 | 0.129 | 0.320 |
| | (0.222) | (0.072) | (0.073) | (0.100) | (0.088) | (0.050) | (0.138) | (0.200) |
| MAGINS | 0.046 | -0.027 | - | -0.048 | 0.013 | 0.063 | <mark>-0.162*</mark> | -0.128 |
| | | | <mark>0.117*</mark> | | | | | |
| | (0.070) | (0.040) | (0.055) | (0.052) | (0.070) | (0.049) | (0.069) | (0.086) |
| SETDIR | -0.206 | <mark>-0.202*</mark> | 0.019 | -0.016 | 0.066 | -0.088 | 0.110 | -0.056 |
| | (0.298) | (0.085) | (0.115) | (0.080) | (0.102) | (0.066) | (0.168) | (0.134) |
| SALARY | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.036 | -0.282 | 0.054 |
| | (.) | (.) | (.) | (.) | (.) | (0.140) | (0.171 | .) (0.089) |

Table 24 (cont'd)

For the leadership function of developing people, Brazil (β =0.094, P<0.05) and Israel (β =0.216, P<0.01) have demonstrated a significantly positive correlation between informal leaders decisive role in developing people and teaching quality. Denmark (β =-0.176, P<0.05), however, as the only country among included countries has validated negative relationship between informal leaders' leading in people development and teaching quality.

For the school leadership responsibility of hiring staff, Brazil (β =0.266, P<0.05), Chile (β =0.929, P<0.01), and France (β =-0.379, P<0.05) among the listed countries have been found a positive correlation between informal leaders' leading or decision making in hiring and teachers' teaching quality. The effect for Chile is extremely large as 0.929, which reveals the teacher or other informal leaders' role in making hiring decision is really important in retaining a team of teachers with high quality of teaching in Chile.

The third leadership role, managing instruction, as discussed above is one of the most important school leadership responsibilities among both formal and informal leaders to secure effectiveness of instruction (Firestone & Martinez, 2007; Lambert, 2013). Among the countries included in this study, Estonia (β =0.116, P<0.05) is actually the only one revealing positive

correlation between informal leaders' leading in instruction-related decisions and teacher's teaching quality. However, Spain (β =-0.149, P<0.05), Romania (β =-0.17, P<0.05), and Sweden (β =-0.162, P<0.05) have been found that their informal leaders' active participation in making school decision of instruction is negatively related to teachers' teaching quality.

For setting the school direction as what is the priority for the school mission, the countries like Bulgaria (β =-0.17, P<0.01), Brazil (β =-0.160, P<0.05), Canada (Alberta) (β =-0.30, P<0.05), Chile (β =-0.672, P<0.05), Norway (β =-0.394, P<0.05) and Portugal (β =-0.202, P<0.05) all demonstrated a negative relationship between informal leaders' leading role in setting school direction and the overall teaching quality. England (β =0.516, P<0.001), nevertheless, is the only one among all 32 countries to have validated a positive relationship between informal leader's active role in setting school direction and teachers' quality of teaching.

The last leadership responsibility is setting the school salary scales, from the data, I observed two important findings, first, the school salary scale and incentive setting is definitely not the teacher's responsibility in most schools and countries. Among the countries that did reveal a significant correlation between informal leaders' leadership role and teachers' teaching quality, the correlation is negative for Finland (β =-0.430, P<0.05) and Israel (β =-0.512, P<0.05), but positive for Malaysia (β =-0.17, P<0.05).

The Impact of School Contextual and Compositional Features on Teaching Quality

Beyond the primary interest of the study to investigate how formal and informal leaders' active role in different leadership responsibilities might impact teaching quality, both Hierarchical Linear Models also included controls in the model at both the school level and the teacher level. The results in the first model indicated that when fitting the model for the impact of formal leaders' leading roles in different school functions on teaching quality, less consistence has been observed at the school level regarding how the principal characteristics and school contextual condition might impact teaching quality. Though I found principal's gender, age, education, experience, employment status, school's location, management type, funding resource, size, school proportion of immigrant or low SES students might be related to school teacher teaching quality, the effect direction varies across countries. There were not consistent findings for the countries listed in this study.

While for teacher characteristics, there are more consistent results observed, for the first model fitted to detect the impact of formal leaders leading role on teaching quality, teachers' gender emerged to be an important predictor of the teacher's teaching quality, except for Japan $(\beta = -0.459, P < 0.001)$ and Korea $(\beta = -0.405, P < 0.01)$ where males teachers have been found being more capable of teaching, there were 17 countries that demonstrated a pattern that female teachers were associated with higher level of teaching quality. Teachers' employment status and experience have been verified to be the other two important predictors of teaching quality. Among the 32 included countries, 10 have been found that their teachers' full time employment status has a positive impact on teaching quality. Meanwhile, 14 countries have reached the same conclusion that teachers' length of service had a positive impact on teachers' self-capacity of teaching. Tenure status was also investigated in this study but only 6 countries have shown a pattern that tenured teachers in fact have higher teaching quality than non-tenured teachers. These findings were also found in the second model with the emphasis of informal leaders' impact on their school teaching quality, similar to the first model, female teachers, full time employment status, experience as a teacher and tenured working contract have been verified to have a positive correlation with teacher' teaching quality in many different countries.

Meta-result of the Effect of Formal leaders' Leading Role on Teaching Quality

The result is displayed in <u>Appendix H</u> as the final combined effects of the formal leaders' leading role in different school leadership responsibilities on school accumulated teaching quality. The result indicates that formal leaders' roles in developing people (β = 0.017, P<0.01) and managing instruction (β =0.006, P<0.05) predict school teaching quality in a positive direction. As with many leadership studies, the effect size is small. The finding conforms to available research evidence that leadership impact on teachers and students might be indirect through more direct impact on school process, staff trust, collaboration, and environment (Heck & Hallinger, 2009; Hughes & Pickeral, 2013; Leithwood, Day, Sammons, Harris, & Hopkins, 2006).

Table 25: Meta-analysis Results of Formal Leaders' Participation in Leadership Responsibilities and its Impact on Teacher Quality

| | DEVELOPING PEOPLE | HIRING | MANAGING INSTRUCTION | SETTING DIRECTION | SETTING SALARY |
|--|--|---|--|--|---|
| Pooled Effect Heterogeneity chi-squared P | 0.017 59.14 (d.f. = 31) 0.002 | -0.012 40.93 (d.f. = 31) 0.109 | 0.006 51.00 (d.f. = 31) 0.013 | 0.009 33.42 (d.f. = 31) 0.351 | -0.026 30.07 (d.f. = 31) 0.514 |
| I-squared Test of ES=0 | 47.60% z= 1.46 p = 0.143 | 38.10% z= 2.21 p = 0.027 | 39.20% z= 0.45 p = 0.651 | 7.20% z= 0.55 p = 0.580 | 0.00% z= 1.12 p = 0.261 |

More specifically, for the leadership role of developing people, Figure 20 reveals the distribution of the 32 countries for their effect size and the weight assigned for the final effect, Portugal, Israel, Brazil and Croatia were assigned more weight due to low standard error for the individual country study. The final pooled effect size is 0.017 with a significant level at 0.002 through Fisher's combined probability test. The I² test indicated that there is more heterogeneity among the studies for how formal leaders' leading role in developing people impacts teaching

quality.

Figure 20: Meta-analysis of Formal Leaders' Role in Developing People on Teaching

Quality



As to the impact of formal leaders' leading role in hiring on teaching quality, the I² test indicated that it is more homogeneous for the studies within 32 countries regarding how formal leaders' leading role in hiring impacts teaching quality. Portugal, Singapore and Slovak were assigned more weight due to low standard error for the individual-country study. The final pooled effect size is -0.012 with a significant level at 0.179 through Fisher's combined probability test. So the formal leaders' involvement in hiring is not significant for predicting teacher's teaching quality in the school.

Figure 21: Meta-analysis of Formal Leaders' Role in Hiring on Hiring



Figure 22: Meta-analysis of Formal Leaders' Role in Managing Instruction on Teaching

Quality



The third meta-analysis done was to investigate how formal leaders' leading role in managing instruction might be related to the teacher teaching quality. Figure 22 has the visual demonstration that it is relatively homogeneous for the studies of 32 countries regarding how formal leaders' leading role in managing instruction impacts teaching quality. Croatia and Portugal share a little more weight and the other countries share pretty equal weight for the final effect. The final pooled effect size is -0.006 with a significant level at 0.022 through Fisher's combined probability test. So the formal leaders' involvement in managing instruction is significantly associated with the teacher's teaching quality in a positive way that formal leaders' active participation in making school decision of instructional content, materials, and courses helps promote teachers' growth in their teaching quality

Figure 23: Meta-analysis of Formal Leaders' Role in Setting Direction on Teaching Quality



For the impact of formal leaders' leading role in setting school direction, the pooled effect from 32 countries is 0.009 with a significant level at 0.395. So formal leaders' decision making

for school direction is not significantly associated with school teacher teaching quality. Figure 24 has the visual demonstration that it is pretty homogeneous for the studies of 32 countries $(I^2=7.2\%)$. Croatia, Portugal, France and Brazil were assigned more weight because their relatively lower variance.

When considering how formal leaders' leading role in setting school salary scale and incentive structure might be related to the teacher teaching quality, Figure 23 combined the results from the 32 countries, and the results demonstrated a really homogeneous pattern among the 32 included studies that $I^2=0\%$. Denmark, Latvia, Poland and Portugal share more weight for the final effect size and the other countries share pretty equal weight for the final effect. The final pooled effect size is -0.026 with a significant level at 0.423 through Fisher's combined probability test. So the formal leaders' involvement in setting salary scale is not significantly associated with the teacher's teaching quality.



| AAD AUS BFL BGR BGR BGR CAB CAB CAB CAB CAB CAB CAB CAB | 0.09, 0.29) 0.3 0.10, 0.12) 2.1 0.24, 0.01) 2.1 0.23, 0.09) 1.1 0.29, 0.04) 1.3 0.29, 0.04) 1.3 0.09, 0.33) 01 0.09, 0.33) 01 0.01, 0.17) 4.1 0.10, 0.06) 5.5 0.18, 0.01) 4.1 0.00, 0.14) 6.1 0.01, 0.00, 0.14) 6.1 0.032, 0.10) 3.1 | 93 84 19 34 30 24 79 26 55 08 86 71 80 78 |
|--|--|--|
| AUS BFL BGR BGR CAB CHL CZE DNK CHL CZE DNK CZE CZE DNK CR CZE CZE CZE CZE CZE CZE CZE CZE CZE CZE | 1.10, 0.12) 2.1 0.24, 0.01) 2.2 0.23, 0.01) 2.2 0.23, 0.01) 2.2 0.24, 0.01) 2.2 0.23, 0.04) 1.3 1.04, 0.70) 0.2 0.09, 0.33) 0.1 0.01, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.06) 5.4 0.010, 0.010 4.4 0.00, 0.14) 6.4 0.018, 0.011 4.4 0.029, 0.010 3.4 0.032, 0.100 3.4 | 84 19 34 30 24 79 26 55 08 86 71 80 78 00 |
| BFL BGR BGR BGR CAB CAB CAB CAB CAB CAB CAB CAB | 0.24, 0.01) 2.° 0.23, 0.09) 1.° 0.29, 0.04) 1.° 0.04, 0.70) 0.° 0.09, 0.33) 0.° 0.01, 0.17) 4.° 0.10, 0.06) 5.° 0.18, 0.01) 4.° 0.00, 0.14) 6.° 0.09, 0.30, 0.14) 6.° 0.09, 0.10) 3.° 0.32, 0.10) 0.° | 19 34 30 24 79 26 55 08 86 71 80 78 09 |
| BGR -007 (f BRA -012 (f CAB 0.12 (f CAB 0.33 (f CZE 0.08 (f DNK -000 (f ESP 0.07 (f EST -0.00 (f FIN 0.00 (f IRR -0.012 (f URA -0.012 (f VITA -0.010 (f JPN -0.010 (f KOR -0.025 (f UVA -0.025 (f NDD -0.026 (f NOR -0.000 (f PRT -0.000 (f ROU -0.000 (f | 0.23, 0.09) 1.3 0.29, 0.04) 1.3 0.04, 0.70) 0.3 0.09, 0.33) 0.7 0.10, 0.06) 5.5 0.18, 0.01) 4.4 0.00, 0.14) 6.8 0.18, -0.01) 4.7 0.09, 0.10) 3.4 0.32, 0.10) 0.7 0.32, 0.10, 0.7 0.32, 0.7 0.32, 0.7 0.32, 0.7 0.32, 0.7 0.32, 0.7 0.32, 0.7 0.32, 0 | 34 30 24 79 26 55 08 86 71 80 78 |
| BRA CAB CAB CAB CAB CAB CAB CAB CA | 0.29, 0.04) 1.3 0.04, 0.70) 0.3 0.09, 0.33) 0.7 0.10, 0.06) 5.5 0.18, 0.01) 4.0 0.00, 0.14) 6.8 0.18, -0.01) 4.7 0.09, 0.10) 4.7 0.32, 0.10) 0.7 0.32, 0.10) 0.7 0.32 | 30 24 79 26 55 08 86 71 80 78 |
| CAB | 0.04, 0.70) 0.2 0.09, 0.33) 0.3 0.10, 0.06) 5.5 0.10, 0.06) 5.6 0.10, 0.06) 4.0 0.00, 0.14) 6.8 0.18, -0.01) 4.3 0.09, 0.10) 3.3 0.32, 0.10) 0.3 | 24 79 26 55 08 86 71 80 78 |
| CHL | 0.09, 0.33) 0.1 0.01, 0.17) 4.2 0.10, 0.06) 5.5 0.18, 0.01) 4.6 0.00, 0.14) 6.8 0.18, -0.01) 4.1 0.09, 0.10) 3.8 0.32, 0.10) 0.7 | 79 26 55 08 86 71 80 78 |
| C2E DNK ENG ESP EST EST EST EST EST EST EST EST EST EST | 0.01, 0.17) 4.2 0.10, 0.06) 5.5 0.18, 0.01) 4.0 0.00, 0.14) 6.8 0.18, -0.01) 4.1 0.09, 0.10) 3.8 0.32, 0.10) 0.3 | 26 55 08 86 71 80 78 |
| DNK | 0.10, 0.06) 5.5 0.18, 0.01) 4.0 0.00, 0.14) 6.8 0.18, -0.01) 4.7 0.09, 0.10) 3.8 0.32, 0.10) 0.7 | 55 08 86 71 80 78 |
| ENG | 0.18, 0.01) 4.0 0.00, 0.14) 6.0 0.18, -0.01) 4.1 0.09, 0.10) 3.0 0.32, 0.10) 0.1 | 08 86 71 80 78 |
| ESP EST FIN FIN FIN FIN FIN FIN FIN FIN | 0.00, 0.14) 6.8 0.18, -0.01) 4.7 0.09, 0.10) 3.8 0.32, 0.10) 0.7 | 86 71 80 78 |
| EST | 0.18, -0.01) 4.3 0.09, 0.10) 3.8 0.32, 0.10) 0.3 | 71 80 78 |
| FIN 0.000 (+ FRA | 0.09, 0.10) 3.8 0.32, 0.10) 0.3 | 80 78 |
| FRA -0.11 (HRV -0.01 (USR -0.01 (UTA 0.02 (JPN -0.25 (UVA -0.25 (MKS -0.03 (MVS -0.06 (NOR -0.000 (POL -0.000 (PRT 0.03 (ROU -0.000 (| 0.32, 0.10) 0.3 | 78 |
| HRV 0.030 (+ ITA 0.03 (+ JPN 0.12 (+ JPN 0.12 (+ JPN 0.12 (+ 0.12 (+ | , | 00 |
| ISR 0.000 (ITA 0.000 (JPN 0.12 (0 VCR 0.12 (0 0.12 (0 0.005 (0 | 0.16, 0.23) 0.9 | 90 |
| ITA 0.12 (intermediate) JPN 0.12 (intermediate) KOR -0.25 (intermediate) LVA -0.05 (intermediate) MYS -0.00 (intermediate) NLD -0.00 (intermediate) NOR -0.00 (intermediate) POL -0.00 (intermediate) POL -0.00 (intermediate) ROU -0.00 (intermediate) | 0.02, 0.20) 2.8 | 87 |
| JPN 0.25 (KOR | 0.11, 0.35) 0.6 | 65 |
| KOR -0.25 (LVA) LVA -0.05 (LVA) MEX -0.03 (LVA) MYS -0.02 (LVA) NILD -0.02 (LVA) NOR -0.00 (LVA) POL -0.03 (LVA) ROU -0.00 (LVA) | .02, 0.22) 3.3 | 36 |
| LVA005 (MEX - 0.08 (+ MYS0.02 (- NLD0.06 (+ NOR0.00 (+ POL0.01 (+ POL0.01 (+ POL0.01 (+ 0.03 (+ 0.03 (+))))) | 0.47, -0.02) 0.6 | 68 |
| MEX 0.08 (MYS - 0.02 (NDR - 0.06 (NOR 0.00 (POL - 0.01 (ROU - 0.06 (- 0.03 | 0.12, 0.02) 7.4 | 48 |
| MYS0.02 ℓ NLD0.06 (NOR0.06 (POL0.01 ℓ POL0.01 ℓ ROU0.03 (4 -0.06 ℓ | 0.07, 0.24) 1.4 | 41 |
| NLD006 (NOR - 000 (+ POL 000 (+ PRT 003 (+ ROU 000 (+ | 0.16, 0.12) 1.3 | 79 |
| NOR ● 0.00 (+ POL ● -0.01 (+ PRT ● 0.03 (+ ROU ● -0.06 (+ | 0.15, 0.02) 4.6 | 69 |
| POL -001 (PRT 0.03 (ROU -006 (|).11, 0.11) 2.8 | 81 |
| PRT 0.03 (- ROU -0.06 (- | 0.09, 0.06) 5.8 | 88 |
| ROU -0.06 (- | 0.05, 0.10) 6.0 | 05 |
| | 0.20, 0.08) 1.6 | 61 |
| SGP 0.06 (-1 | 0.02, 0.13) 6.6 | 69 |
| SRB 0.00 (- | 0.09, 0.10) 3.6 | 67 |
| SVK -0.05 (| 0.13, 0.02) 5.8 | 88 |
| SWE -0.03 (* | 0.13, 0.07) 3.4 | 48 |
| USA -0.01 (* | 0.29, 0.26) 0.4 | 44 |
| Overall (I-squared = 41.2%, p = 0.009) -0.00 (| 0.00.0.04 | 00.00 |
| | 0.02, 0.01) 10 | |

Meta-result of the Effect of Informal leaders' Leading Role on Teaching Quality

The significance of the study for distributed leadership is to investigate how the leadership distribution and the informal leaders' participation in leading the school would benefit the school in many aspects. Currently available research has provided evidence regarding how the distribution of leadership might improve school social capital in staff commitment (Hulpia et al., 2012), collaboration (Angelle, 2010), job optimism (Mascall et al., 2008), and school academic capacity (Heck & Hallinger, 2009), etc., while very little evidence is available regarding how informal leaders' participation in leading school will help develop and grow people within the organization. Given school is an open system that the teachers are loosely coupled with the principal (Weick, 1976), teachers' voice and leading is essential for them to proactively be involved in school decision making and help them seek the sense of belongs for their continuous professional development. This study provided direct evidence that informal leaders' role in school leadership responsibilities have important impact on their growth and the perspective towards teaching.

Table 26: Meta-analysis Results of Informal Leaders' Participation in Leadership Responsibilities and its Impact on Teacher Quality

| | DEVELOPIN G PEOPLE | HIRING | MANAGING INSTRUCTION | SETTING NDIRECTION | SETTING SALARY |
|---------------|---|-------------|-------------------------|-----------------------|-------------------|
| Pooled Effect | $\begin{array}{c} 0.004 \\ 54.50 \\ (d.f. = 31) \\ 0.006 \end{array}$ | 0.038 | 0.009 | -0.037 | -0.049 |
| Heterogeneity | | 48.49 | 47.52 | 54.76 | 57.12 |
| chi-squared | | (d.f. = 30) | (d.f. = 31) | (d.f. = 31) | (d.f. = 15) |
| P | | 0.018 | 0.029 | 0.005 | 0.000 |
| I-squared | 43.20% | 38.10% | 34.80% | 28.90% | 0.00% |
| Test of ES=0 | z=0.35 | z=2.21 | z=0.76 | z=2.00 | z= 1.61 |
| | p = 0.729 | p=0.027 | p=0.447 | p=0.045 | p = 0.107 |

For the leadership role of developing people, Figure 25 reveals the distribution of the 32

countries for their effect size and the weight assigned for the final effect, Portugal, and Brazil were assigned much more weight than the other countries. The final pooled effect size is 0.004 with a significant level at 0.007 through Fisher's combined probability test. The I^2 test (43.2%) indicated that there is more heterogeneity among the studies for how informal leaders' leading role in developing people impacts teaching quality.

Figure 25: Meta-analysis of Informal Leaders' Role in Developing People on Teaching Quality



As to the impact of informal leaders' leading role in hiring on teaching quality, I² (38.1%) test indicated that it is relatively heterogeneous for the studies within 32 countries regarding how informal leaders' leading role in hiring impacts teaching quality. Estonia, Denmark, Slovak and Croatia were assigned more weight due to low standard error for the individual country study. The final pooled effect size is 0.038 with a significant level at 0.004 through Fisher's combined probability test. So the informal leaders' involvement in hiring is essential for schools to recruit
and maintain teachers with higher teaching quality.



Figure 26: Meta-analysis of Informal Leaders' Role in Hiring on Teaching Quality

The third meta-analysis done was to investigate how informal leaders' leading role in managing instruction might be related to the teacher teaching quality. Figure 27 has the visual demonstration that it is relatively homogeneous for the studies of 32 countries regarding how informal leaders' leading role in managing instruction impacts teaching quality. Brazil, Estonia and Portugal possess a little more weight and the other countries share pretty equal weight for the final effect. The final pooled effect size is 0.009 with a significant level at 0.027 through Fisher's combined probability test. So informal leaders' involvement in managing instruction is significantly associated with the teacher's teaching quality in a positive way that it is vital for informal leaders to be included in making school decision of instructional content, materials, and courses. The decisive role of informal leaders' in managing instruction helps promote teachers' growth in their teaching quality.

Figure 27: Meta-analysis of Informal Leaders' Role in Managing Instruction on Teaching

Quality



Figure 28: Meta-analysis of Informal Leaders' Role in Setting Direction on Teaching

Quality



For the impact of formal leaders' leading role in setting school direction, the pooled effect from 32 countries is -0.037 with a significant level at 0.005. Informal leaders' decision making for school direction is significantly associated with school teacher teaching quality, but the effect is negative. Figure 29 has the visual demonstration that it is less homogeneous for the studies of 32 countries (I^2 =43.4%). Brazil, Denmark and Slovak were assigned more weight.

Figure 29: Meta-analysis of Informal Leaders' Role in Setting Salary on Teaching Quality



When considering how informal leaders' leading role in setting school salary scale and incentive structure might be related to the teacher teaching quality, Figure 30 combined the results from the 32 countries, and the results demonstrated a really heterogeneous pattern among the 16 countries included in the final analysis I²=73.7%. The dropped countries had missing data for all the observations so it indicated informal leaders in these countries do not participate in leading for school salary setting at all. Brazil, Denmark, Latvia, and America among the included countries share more weight for the final effect size. The final pooled effect size is -0.049 with a significant level less than 0.001 through Fisher's combined probability test. So informal leaders'

involvement in setting salary scale is negatively associated with the teacher's teaching quality.

Conclusion

This chapter presented the findings for three research questions. In conclusion, there is variation among countries for their distributed leadership patterns, and the schools with different contextual and compositional factors vary in adopting different distributed leadership patterns. Finally, the most important findings are formal leaders' participation in developing people and managing instruction, as well as informal leaders' participation in developing people, hiring, and managing instruction have a positive impact on school teacher teaching quality. The next chapter will discuss these findings in depth.

CHAPTER 5: SUMMARY AND CONCLUSION

I do not believe the finding and interpretation is not one-dimensional as my research involves three research questions, and the context for this research is more complicated given the study involved 32 countries in the analysis. In this chapter, I will provide further observations and discussion in relation to this study's over-arching research questions.

The Purpose of the Study

The purpose of this study was to determine how leadership is actually distributed among the position holders and informal leaders, and what the impact of varied involvement by both groups is on teacher and teaching.

Researchers argue that schools' varied leadership pattern has an important impact on teaching and learning (Korkmaz, 2007; Nir & Hameiri, 2014), schools should involve teachers in schools' decision making and management because teachers have the expertise in instruction, student management and subject content knowledge (Crowther et al., 2009; Harris & Muijs, 2005). Evidence supports teachers learn from each other (Jackson & Bruegmann, 2009) so the involvement of teachers in the school leadership responsibilities like managing instruction, hiring and developing people should have a positive impact on developing people within the school. However, though distributed leadership is regarded as one promising way of improving school organizational capacity through involving teachers and community into school management (Leithwood, Louis, et al., 2004); and the evidence has been steadily accumulated regarding the impact of adopting distributed leadership on teacher attitude like commitment (Hulpia et al., 2012), and satisfaction (Rosseel et al., 2009) since the last decade, the direct evidence regarding whether the implementation of distributed leadership has the positive impact on teachers and teaching was not readily available.

My interest is also derived from the call to contextualize distributed leadership and delve into whether the school context and student composition would predict how and to what extent leadership is distributed among people within the school (Edwards, 2011). This kind of study to contextualize instructional leadership revealed that school contextual and compositional factors along with the principal characteristics are the important predictors of the implementation and effectiveness of instructional leadership (Hallinger et al., 1996; Heck & Marcoulides, 1990; Zheng, 1996). This current study constructed the measurement of formal and informal leaders' involvement in each of the school roles and combined the two measurements to detect the pattern of distributed leadership; the purpose is to compare whether the schools that are with different management types (public or private), funding and size, and the principal's demographic and educational backgrounds would differ school from each other in adopting leadership distribution.

Moreover, I am interested in positioning distributed leadership in an international context to compare how the leadership distribution pattern for each of the school responsibilities varies from school to school, and from country to country. More importantly, the very important component of the research is to detect whether there is pattern of leadership distribution emerging for the high-performing schools and countries, which is important to provide useful evidence when conducting leadership research in order to help low-performing schools and countries to promote school organizational capacity and effectiveness.

Findings Summary

Research Question 1: There are Variations for How Leadership is distributed across Countries

After constructing the latent variable to quantify the extent of involvement by formal and informal leaders respectively in each of the school leadership responsibilities, I conducted

correlation and the scatterplot to explore formal and informal leaders' role in leading. The scatterplot for leadership by the two leadership groups for each individual country presents a landscape of how the variation exists between countries for leadership distribution.

The first finding is when pooling all countries together with the five leadership distribution patterns, there is no consistency among all five leadership roles. The only country is England that has consistently revealed the leadership distribution pattern as Collective Network. For England, both formal leaders as the principal and the management team, and informal leaders including mentors and teachers proactively participate in all five leadership responsibilities in the school. This is a thought-provoking finding regarding how the national policy and research would shape and change school leadership practice. England has active interest in distributed leadership from both the policy makers and researchers. A very large proportion of available research in distributed leadership was produced in England by renowned researches like Harris, Wood, Bennett, Bolden, Macbeth and so on. These people have been proactive in advancing theoretical frameworks and practical models for distributed leadership; at the same time, the National College of Teacher and Leadership, a government agent, has been devoted in promoting the research and practice of distributed leadership. It appears that the advocacy from the government agencies and research have fundamentally shaped the school leadership practice in this particular country.

The other countries that have more Collective Network pattern of distributed leadership (Pattern 4) include Denmark, Estonia, Latvia, Norway, Slovak Republic. These countries are all located in Eastern or Northern Europe that have long seen democratic patterns of leadership as an essential component for equitable schooling (Harris, 2011). Undergoing educational reform in these countries results in a more normative stance towards endorsing and reinforcing

collaborative leadership practices in the school.

The second interesting observation relates to the variation of who participates in school leadership roles of instructional management and developing people. Among 32 participating countries, 29 countries have demonstrated that informal leaders are frequently involved in either teacher development or instructional management demonstrated by the distributed leadership pattern as either 3 (Cooperative Network) or 4 (Collective Network). This research confirms earlier findings of Leithwood and his colleagues (2007) in their qualitative research that has successfully revealed teachers were frequently involved in school leadership responsibilities including instructional management, developing people and designing organizational structure and clarifies work by Spillane et al. (2007) who showed that the principal was co-leading with teacher for a 2/3 time regarding school leadership functions.

| | | | Count | | |
|------------|--------|------|--------|-----|--------|
| DL Pattern | SETDIR | DPEP | MAINST | HIR | SALARY |
| 4 | 12 | 11 | 12 | 16 | 13 |
| 3 | 7 | 7 | 4 | 2 | 5 |
| 2 | 7 | 6 | 5 | 4 | 7 |
| 1 | 6 | 8 | 11 | 10 | 7 |

Table 27: Pooled Distributed Leadership Patterns across Countries

The only countries that do not have teachers involved in these two essential leadership roles in developing people and managing instruction are Chile, France, Canada and America. As a matter of fact, French and American schools have very low extent of participation by both the formal leaders and teachers in developing people and managing instruction. These two countries have Pattern 1 for developing people and managing instruction. This finding reveals that American teachers are limited in their ability to participate in school leadership responsibilities especially those responsibilities directly related to teaching and teacher professional development. The current research, by explicitly categorizing leadership functions, indicates that the involvement of teachers in the instruction-related leading is not satisfactory in America.

A third key finding related to patterns of leadership distribution is that, for all the leadership responsibilities, we have observed pattern 4 of distributed leadership (Collective Network) more than the other patterns, revealing an important reality that leadership responsibilities are generally fulfilled by both the formal and informal leaders in many countries. This finding resonates to what Leithwood and his colleagues found that teachers and other informal leaders are proactively involved in vital school leadership functions as developing people, designing the organization, managing instruction. The only leadership responsibility that is exclusively fulfilled by position holders in the school is setting the school direction. But this research found even for setting the school direction, there is frequent participation by the community into decision making in many countries.

Research Question 2: Schools with Different Contextual and Compositional Factors Differ from Each other Regarding the Leadership Distribution Pattern?

This research is interested in contextualizing distributed leadership in different contexts. Through variance analysis towards school contexts and the principal characteristics as dependent on the distributed leadership, this research found schools vary significantly in adopting leadership distribution patterns. The first emphasis is how schools vary as characterized by the principal characteristics. The independent factor in the analysis is the categorical variable that includes 4 scales standing for the four distributed leadership pattern. This study used Chi-square test for the principal's gender, Kruskal-Wallis equality-of-populations rank test for the principal's education and experience, and one-way ANOVA for the principal's age. Principals' gender is a categorical variables so ANOVA that assumes data normality does not work as Chisquare test for two categorical variable. Kruskal-Wallis test does not assume data normality so it works for ordinal variable (principal education) or data that are not normally distributed (principal's experience) (UCLA). The results indicate leadership distribution patterns differ from school to school with the principal of different gender, age groups, educational background and experience for varied leadership responsibilities.

Specifically, for setting school direction, managing instruction, and developing people, female leaders tend to involve more informal leaders. Older and more experienced leaders are more likely to distribute leadership in the school. However, for hiring and setting the school salary, though there is significant variance found for the principal's characteristics, more schools demonstrate to have either Pattern 1 or 2 that neither of the two groups or merely formal leaders' are involved in these two roles.

The principal's experience demonstrates to be the most important indicator of what kind of distributed patterns exist in the school. It is obvious and consistent across all the leadership functions that more experienced principals play essential roles in setting the direction, developing people, managing instruction and hiring staff, joined by informal leaders in many countries. The essential finding is that the school with more experienced principals generally tend to involve informal leaders to take important leadership responsibilities, especially for instruction related decision making.

The school's funding resource, management type, size and school student composition have also been found to be essential in grouping schools adopting different leadership distribution patterns. In general, the private schools and schools with less than 50% of funding have more informal leaders involved for developing people and managing instruction, while less for setting the direction. All the schools, in general, have less informal leaders' participation in hiring and setting salary. The role for fulfilment of hiring and setting salary scales obviously fall

out of schools. In addition, the pattern of leadership distribution has been found to be different for schools with varied proportion of low-income students, in sum, the more the school has poverty students, the less the informal leaders are involved in the school leadership responsibilities.

Research Question 3: Informal Leaders' Role in Developing People, Managing Instruction, Hiring and Formal Leaders' Involvement in Developing People and Managing Instruction Positively Predict Teaching Quality

The third research question required digging into all aspects of the data. The finding for 32 individual countries generated various effects for the leadership roles by formal leaders and informal leaders on teaching quality. The meta-analysis result, however, found formal leaders' leading roles in developing people (β = 0.017, P<0.01) and managing instruction (β =0.006, P<0.05) positively predict school average teaching quality. As with most leadership research, the effect size is very small, and thus this finding resonates with available research evidence that the leadership impact on teachers might be indirect. This study also provided direct evidence that informal leaders' roles in school leadership responsibilities have important impact on teachers' growth and the quality of reaching. More specifically, the informal leaders' role in developing people (β = 0.004, P<0.01), hiring (β = 0.038, P<0.05) and managing instructional related issues (β = 0.009, P<0.05) have a significant impact on teaching quality, though, again, the pooled effect size is very small.

The HLM analysis revealed inconsistent results from country to country and the Metaanalysis revealed significant but small pooled effects. Former research disclosed important impacts of leadership on school climate, learning environment and process (Leithwood, Seashore-Louis, Anderson, & Wahlstrom, 2004; Robinson, 2008), and on teachers' satisfaction,

commitment and optimism (Heck & Hallinger, 2009; Hulpia et al., 2012; Mascall et al., 2008), which are important pathways to good schools. However, this is an assumption derived from my understandings of the leadership distribution perspective that the leadership also has an impact on teaching and learning; as such, though the effect size is small for this study, I argue that we need more evidence on whether instructional leadership, or transformative leadership would have a direct impact on overall teaching. The available research (Leithwood & Jantzi, 2012; Marks & Printy, 2003) have revealed shared instructional leadership allied with transformative leadership had a positive impact on teacher pedagogical skills, and collective leadership has an impact on teacher knowledge. The concern raised through my research is how big the effect size is from leadership practice on teaching directly.

In sum, the three questions asked in this research revealed there is variation regarding how leadership is distributed between formal and informal leaders in these countries studied for each of the leadership responsibilities, more countries have both formal and informal leaders involved in leading, especially for managing instruction, developing people and hiring the new staff. Schools vary from each other for leadership distribution patterns with regard to the principal's experience, education, gender and age, as well as the school's context and poverty status. The HLM and Meta-analysis revealed informal leaders' role in managing instruction, developing people and hiring is significantly important in predicting the school's overall teaching quality, so is the formal leaders' role in developing people and managing instruction. I depict these effects in the figure below, which summarizes these findings that have been investigated for the three research questions in this study as how leadership is distributed between formal and informal leaders, what is the variation among schools with different contextual and compositional factors and how the variation impact teaching quality.



Figure 30: Research Findings Summary

Limitation of the Study

The findings of this study need caution when interpreting, as all the leadership responsibility by task questions were completed by the principal, and the teaching quality measurement were self-reported by the teachers. Earlier study that compares the principal and teachers' perspective regarding whether leadership is distributed in the school using the same TALIS data set found that the principal generally reported higher extent of leadership distribution than the teachers (Liu, Bellibas, & Printy, 2016). Another study (Liu & Liao, 2016) seeking to detect teachers' self-efficacy in teaching found teachers in high-performing countries like Finland and Singapore comparatively reported lower level of self-efficacy in teaching than their peers in even low-performing countries, which could be the result that these teachers had higher expectation for themselves and teaching, explained perhaps by cultural influence and selfexpectation (Cheung, 2008; Hairon & Dimmock, 2012). An explanation has been offered by Bandura's (1986) social cognitive theory which points to the importance of expectation. In addition, an individual country's social and cultural aspects could also impact how teachers judge their own teaching (Cheung, 2008; Hofstede, 1984). Therefore, all comparisons involving self-reported data need consideration of a range of elements when making comparisons.

This study explains that the varied levels of leadership distribution does predict variation in teaching quality. However, caution should be applied when considering the scope of this study. Leadership practice is only one factor that could influence teachers' teaching. Teacher quality is significantly impacted by individual teachers' psychological and emotional conditions (Bandura, 1977; Rotter, 1966). In addition, schools are organizations that involve complicated processes and possess varied incentives, people, culture and structures, which all simultaneously impact people in the setting (Senge, 1995). Meanwhile, different nations/societies have different cultural beliefs about education, teachers, teaching (Den Hartog et al., 1999), and those beliefs could also influence teachers' teaching. This study tried to involve broad individual and organizational measurable factors in the mixed regression models as controls. Even so, comparing unconditional model to fully fitted models, I found that the predictors explained a relatively small amount of variance for teachers' teaching. This result urges pursuit of factors that might add to our understanding of factors that make a difference for teaching, perhaps some psychometric and intrinsic features possessed by individual persons that are not measurable by available data.

As the third limitation of this study, the correlations described here have an obvious

nonrecursive nature where leadership distribution affects the teacher's teaching, and the individual efficacy then correspondingly influence the extent to which the teacher participates in the school leadership responsibilities. Additionally, the TALIS survey assesses the teacher perception, belief and practice only at one point when they take the survey. The TALIS study has a five year interval for each survey administration, and there have been only two rounds of the studies done so far in 2008 and 2013 respectively. Therefore, it is fundamentally difficult to conduct a nonrecursive analysis using a set of longitudinal and dynamic data responses to track the trajectory of the mutual effect between leadership distribution and the teacher's capacity of teaching. In any case, the existence of this study loop would fundamentally enhance the theoretical importance of the effects of intense participation by teachers in leading on teachers' effectiveness in teaching, but the long-time mutual influence and the trajectory is difficult to be tracked using TALAS data for now.

The Future Study

Given the former research evidence and the findings from this study, I would suggest further research to look in the mediating effect of people's attitude, efficacy, and intrinsic motivation on teaching quality in a distributed leadership model with a consideration of school contexts and academic climate.

Former research found a principal or teachers' perception of higher extent of leadership distribution is positively associated with the principal's job satisfaction (Devos & Hulpia, 2009), teacher's organizational affiliation and satisfaction (Angelle, 2010), organizational commitment (Hulpia & Devos, 2010; Hulpia et al., 2012; Hulpia et al., 2009), academic optimism (Chang, 2011; Mascall et al., 2008), and both the principal and teachers' commitment, cohesion and satisfaction (Liu & Printy, 2016). These confirmed evidences all direct distributed leadership to

the people's intrinsic attitude towards their work, since this study did not find s strong association between formal and informal leaders' roles in leading and the teachers' capacity of teaching, it would be essential to delve into the realm with a broader scope that involves both the principal and teacher's intrinsic conditions in the model as the mediator between the extent of leadership distribution and the school's human or intellectual capital.





As indicated earlier in this dissertation, the school's organizational capacity building is not only through one aspect but rather a combination of both the social capital and the human capital (Dimmock, 2012). It is vital for schools to have both key components perceived as high to increase the school's capacity for excellence (Hargreaves & Fink, 2006). Therefore, whether distributed leadership practice would impact social capital and ultimately impact school human capital and outcomes need evidence. The following framework is proposed for the future study. In this model, I seek the impact of leadership distribution on school intellectual capital by adding the school' social capital like trust, satisfaction, commitment as the mediators. The leadership has been confirmed to have indirect impact on students through teachers, but how leadership impacts teachers is actually not clear in the available research.

Secondly, this research investigated the leading responsibilities by the formal and informal leadership, which combined the principal and the management team in formal leader group, teachers and governing board as the informal leader group. As a matter of fact, the result of the weak association between formal and informal leaders and school human capital might be the result of the weakening effect by two groups in one block. Specifically, as governing board's involvement in school leadership roles especially the roles in instruction and developing people in many countries might be less than teachers. So the extent of the participation through the latent measurement for the both groups is possibly weaker than only one group. One research detecting how teacher leadership is associated with teacher quality found stronger effect between the extent to which teachers participate in developing people and managing instruction and overall teacher quality in the school . Therefore, the future research needs to separate these groups and detect which group's leading in which leadership roles in more important than the others.

Thirdly, for the impact of distributed leadership on school social capital, available research measured distributed leadership primarily through the perception of school shared culture, shared decision making, shared visions and shared leadership responsibility. The direct measurement of how the leadership responsibilities are actually shared among different groups has not been linked to school social capital. Therefore, a more nuanced understanding of whose role in leading the school responsibilities might have more impact on school social capital like the leader and faculty satisfaction, school culture, staff trust and mutual respect, staff collaboration and shared instructional practice. These independent focused need evidence through rigorous analysis on whose role is more important in predicting a positive outcomes of these variables. In addition, as

discussed in chapter 2, teacher quality is a comprehensive aspect that includes teacher's prerequisite qualifications, attribution and teaching practice that will ultimately impact students. Therefore, the further research linking distributed leadership with teacher attribute like their efficacy in teaching is also necessary. A collective aspects of teaching quality and teaching efficacy in the school will also be the emphasis for the future study.

CHAPTER 6: POLCY IMPLICATION AND CONCLUDING REMARKS

With the inauguration of the No Child Left behind Act since 2001, a new emphasis was placed on schools to raise student achievement. The principals' role is getting increasingly complex and multi-dimensional in a new era of accountability (Valli & Buese, 2007). There has been an emergent belief that distributed leadership can lead to improved instruction and learning (Heck & Hallinger, 2009). Findings from the former research (Leithwood & Jantzi, 2012; Spillane et al., 2007) suggested that schools needs to be leaded by a group of people for the multiple tasks. Distributing leadership has the potential to improve school organizational capability and help to sustain improvement in student learning with a wild responsibilities shared among the school community? The increasing interest in distributed leadership shows the need to understand the practice and its impact in schools. However, the lack of empirical evidence that connects the patterns of leadership distribution to teachers and students has made schools cautious in adopting it (Copland, 2003).

The current study was based on the distributed leadership conceptual framework by Peter Gronn, James Spillane, and Kenneth Leithwood who chronically focus their attention on leadership and its impact on teaching and learning. This study sought to provide a practicable framework for distributed leadership with the evidence on who needs to be involved and what is the impact. The study presented a holistic view of distributed leadership practice in 32 participating countries in TLIAS 2013 study with more than 100,000 schools; therefore, this study is important for three reasons. First, this research is an international benchmarking study that provides evidence on what differs high-performing countries from low-performing countries with a distributed leadership perspective. Second, this research for the first time quantified informal and formal leaders' involvement in each of the leadership roles and compares the variation among 32 countries Third, this research for the first time linked the extent of participation by formal and informal leaders with the school intellectual capital -- teaching quality.

It was expected that the recommendation for how to implement distributed leadership in the school would be made based on the findings of the study. I sought to provide answers to questions of researchers, policymakers, and practitioners who need to cope with increasing critical issues associated with implementing standards-based reform, and the achievement gap that currently exists among schools across the nation (Howard, 2015). I had hoped to contribute to building the school capacity by providing direction about involving right people in leading, but the findings did not support this intention for broad generalizability.

Policy Implication

Before I conducted the current research, I could not locate any individual study that compared how leadership is distributed in different countries by quantifying the leadership fulfillment among formal and informal leaders adopting a collective leading model. OECD's executive report of 2013 TALIS study merely had a descriptive analysis with 4 questions asking whether the school provided the opportunity for the teachers, parents and students to participate in school decision making, and considered the extent of the opportunity for these three groups as the sign of distributed leadership. This measurement is far less comprehensive and incomplete. Therefore, I delved to quantify how the formal leaders and informal leaders participate in different leadership roles as the way to gauge distributed leadership practice in the school. My assumption is that the higher level of informal leaders' active roles is considered as an existence of distributed leadership in the school, and I wished to compare the extent to which informal leaders are involved in the school leading in different countries.

One thought-provoking finding is that the United States is one of only four countries that has low levels of both formal and informal leaders' participating in school instructional management and teacher development. This finding advocates for the policy makers at the national and state levels to address the school community building issue in many American schools because both formal leaders as the principal and management team and informal leaders as teachers and governing board are not paying much attention or spending much time on developing schools' human and instructional capacity. Given the fact that many states have adopted initiatives to enhance teacher quality (e.g., teacher evaluation and administrator observation and feedback) (Darling-Hammond, 2015), the finding from this research deserves careful thought about why the current policy of accountability has not yet boosted the interest of both the principal and teachers in instruction and developing people in the school. This might explain the reason why NCLB is considered as a failure rather than a success (Apple, 2007; Guisbond & Neill, 2004).

By bringing the evidence from top-performing countries, I concluded that having both the formal leaders and the informal leaders involved in instructional management, and in-school people development is essential as the countries that have better achievement for PISA 2012 test do reveal consistent informal leaders' leading role in both or either of these two essential school responsibilities. Singapore, Japan, Korea and Australia etc. all have higher extent of both groups' active leading in developing teachers. England and many European countries like Norway, Finland, Estonia and Slovak Republic demonstrate to have a collective network within the schools that all people are held accountable for school leadership responsibilities, as Harris (2011) indicated in her research that many Scandinavian and nearby countries consider a shared leadership as the way to promote school equity and success. At the national level, their research

associations are promoting distributed leadership study and practice by providing evidence and guidance.

The findings of this study do provide evidence advocating for a promotion of distributed leadership in the school, not to spare the principal from extra work but in an effort to build the school leadership and human capacity by involving all stakeholders in school management. From an accountability perspective, enhancing capacity is the responsibility of all educators not just principals.

An emphasis on building learning community, recruiting and retaining highly-effective teachers has steadily been the focus of policy makers and administrators (Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010; Cohen, McCabe, Michelli, & Pickeral, 2009; Tutt & Williams, 2012). Many countries need teachers to possess bachelor's degree and be certified to teach, while available research could not provide consistent findings on whether credentials make a good teacher, though the positive effect of teachers on the student has been consistent (Nye, Konstantopoulos, & Hedges, 2004; Rivkin et al., 2005; Rockoff, 2004).

Meanwhile, since the nature of and the environment for teaching is getting increasingly complex in a new era of accountability (Valli & Buese, 2007), it is essential to uninterruptedly support teacher and teaching through in-service professional development, mentoring, and teaching feedback etc. (Avalos, 2011). Because of the tight budget in education and the busy schedule for teachers, it is very unlikely the teachers can participate in all kinds of off-campus professional developments. The opportunity for the teachers to grow inside the school is fundamentally essential, but how teachers develop capacity that makes a difference to teaching by devoting in school daily management lacks the evidence to seek policy attention. This evidence needs to validate whether and to what extent teachers' participation in leading is

positively associated with teachers' effectiveness in teaching.

Therefore, teachers' continuous development stands out to be important if the teachers' pre-service credentials cannot guarantee successful teachers. However, available research has not provided direct evidence for the policy makers to address the issue as whether providing teacher's opportunities to participate in leading will help develop a teacher with pleasing teaching quality. This study provided evidence that informal leaders' leading in school instructional management, developing teachers, and hiring is vital for schools to recruit high-quality teachers and maintain their growth in the school. This evidence advocates for the schools to build the platform for teachers with expertise to lead their own collective leaning and professional development and make decisions regarding schools instructional decision, which will ultimately impact teacher and teaching.

Another important implication is who to be involved in which leadership responsibilities. This research has filled the existing gap by providing evidence through linking the extent of both formal and informal leaders' participation in each of the five school essential roles with teacher teaching quality. The positive effect has been found when the formal leaders participate in developing teachers and managing instruction. These are essential roles directly define a principal as an instructional leader. In a very wildly-used model created by Hallinger and Murphy (1985), the effective instructional leaders need to focus on managing the school instruction related issues, and create a positive learning environment for both the teachers and students to learn and develop. But this study does not find that setting the school direction by formal leaders has been associated with teaching quality. Setting school mission and direction and communicate with teachers is one of the third dimensions in their instructional leaders model as essential for an instructional leader. As for the informal leaders' role, this research found that informal leaders including teachers and governing boards' role in developing people, managing instruction and hiring has a significant impact on teaching quality. It is interesting to observe the informal leaders' role in hiring is more important. Teachers with content knowledge and instructional skills have insight for who will be a good teachers. So this also applies to the negative effects found when informal leaders are leading in setting the school direction and setting the salary scales. Teachers might not have the expertise in leading these roles, which is revealed to be unhelpful for their teaching capacity building.

These nuances need to be addressed in a distributed leadership model since for a long time, distributed leadership has been a concept of inclusiveness and involvement. There is no prior evidence, however, regarding who to be involved and in which leadership roles, and what is the importance to involve specific groups in particular leadership roles. I think the significance of this study is to have provided evidence for policy makers and practitioners to build their own leadership distribution model by involving people with expertise for each role. In general, both the formal leaders and informal leaders need to be accountable for instruction and teacher development.

How Could Distributed Leadership be implemented in the School?

While, with the theoretical advancement and evidential support for the effectiveness of distributed leadership, there is no universal distributed leadership model fit all schools, instead, distributed leadership needs to be contextualized in different situations (Liu et al., 2016). There are critical questions about what leadership responsibilities should be distributed, with whom principals could share the leadership responsibilities, and how the collaborative leadership fulfillment might benefit the school? An effective distributed leadership model is a

comprehensive blueprint for how the particular school deploys leadership to achieve its core mission-improving the quality of teaching and learning.

Figure 32: Distributed Leadership Model



A developing model with the new research evidences found in this study answers some critical questions including:

Leadership Responsibilities: What core leadership roles should involve teacher leaders?

- **Evidence:** Hiring people, developing teachers and managing instruction
- Informal Leaders: Who should be included in the leadership responsibilities?
 - Evidence: Teachers, parents, and students
- Structure: How will leaders be deployed to support school success?

- Evidence: Shared decision-making. Collective Network that both formal and informal leaders collaboratively lead with configured organizational structure and allocated time
- Emphasis: What should be addressed when distributing leadership?
 - **Evidence:** Involving appropriate people with expertise in leading
- Benefit: How will distributed leadership benefit schools?
 - **Evidence:** Both social capital and human capital increase in the school

Concluding Remarks

This research is interested in detecting, in a distributed leadership model, who actually has the responsibilities for different leadership functions. The first interest was to compare different nation's varied extent of adoption for distributed leadership and how it might be the sign of school effectiveness. Moreover, this study explored how schools have different features differ from each other regarding the leadership distribution patterns. Thirdly, the study was interested in relating distributed leadership directly to school intellectual capital. These research questions are all innovative because no comparative study exists for distributed leadership, no study has contextualized distributed leadership in different schools with various contextual and compositional features using large-scale data; and no study has related different groups' roles with teaching quality. In addition, the method used in this study is rigorous, through latent trait construct, HLM for individual country and meta-analysis to have synthesized all countries' regression effects, the finding is generalizable to an even broader context. What's worth mentioning is the way of adopting meta-analysis in international comparative study with largescale cross-national data is relatively new.

This research was fortunate to have data from the Teaching and Learning International

Survey 2013 (TALIS 2013), an international survey on teachers and school leaders. TALIS data has collected cross-national data on the topics both leadership distribution and teacher quality, which makes it possible to address the aforementioned limitations in current literature. The dataset is from 2013 TALIS lower secondary pool with 32 countries' data for more than 100,000 teachers within 6455 schools. Using international large-scale dataset, I contribute to the field with cross-national, statistically testified evidence about both the direction and the magnitude of the association between formal and informal leaders' authentic participation in leading roles and teacher quality. More importantly, this study deepens the understanding that what truly means about distributed leadership is the mutual interaction among the leaders, the subordinates and the situation by contextualizing distributed leadership in different countries and different schools. Taken together, these contributions to research can be translated into practical information to policy maker, leaders and community across nations when they are working together to enhance teacher quality and school effectiveness by truly building the school leadership capacity.

The findings support the argument expounded by current advocates of distributed leadership in the school (Lashway, 2006; Leithwood et al., 2009; Spillane et al., 2007; Thorpe et al., 2011), that school leaders need to distribute leadership to people with expertise. Three-step study of latent construct, HLM and meta-analysis revealed the relationship between distributed leadership practices and teacher effectiveness. Specifically informal leaders play essential roles in securing the school's teaching quality by leading the participating in school people development, and instructional decision, so do the formal leaders in these important school responsibilities to secure high-quality teaching. **APPENDICES**

APPENDIX A: List of the Participating Countries or Regions in TALIS 2013

| Country | ISCED Level 1 | ISCED Level 2 | ISCED Level 3 | PISA Link |
|--------------------|---------------|---------------|---------------|-----------|
| Australia | | Yes | Yes | Yes |
| Brazil | | Yes | | |
| Bulgaria | | Yes | | |
| Chile | | Yes | | |
| Croatia | | Yes | | |
| Czech Republic | | Yes | | |
| Cyprus1,2 | | Yes | | |
| Denmark | Yes | Yes | Yes | |
| Estonia | | Yes | | |
| Finland | Yes | Yes | Yes | Yes |
| France | | Yes | | |
| Iceland | | Yes | Yes | |
| Israel | | Yes | | |
| Italy | | Yes | Yes | |
| Japan | | Yes | | |
| Korea | | Yes | | |
| Latvia | | Yes | | Yes |
| Malaysia | | Yes | | |
| Mexico | Yes | Yes | Yes | Yes |
| Netherlands | | Yes | | |
| Norway | Yes | Yes | Yes | |
| Poland | Yes | Yes | Yes | |
| Portugal | | Yes | | Yes |
| Romania | | Yes | | Yes |
| Serbia | | Yes | | |
| Singapore | | Yes | Yes | Yes |
| Slovak Republic | | Yes | | |
| Spain | | Yes | | Yes |
| Sweden | | Yes | | |
| USA | | Yes | | |
| Abu Dhabi (United | | Yes | Yes | |
| Arab | | | | |
| Emirates) | | | | |
| Alberta (Canada) | | Yes | | |
| England (United | | Yes | | |
| Kingdom) | T 7 | T 7 | | |
| Flanders (Belgium) | Yes | Yes | | |

Table 28: List of the Participating Countries or Regions in TALIS 2013

Source: OECD TALIS Database

APPENDIX B: Overview of the Core Samples in All TALIS 2013 Participating Countries

| | Number of ISCED 2 Schools | Number of ISCED 2 Teachers | School Sample Size | Teacher Sample Expected Size |
|------------------------|---------------------------------|----------------------------------|-----------------------|------------------------------------|
| Australia | 2 869 | 84 474 | 154 | 3 080 |
| Brazil | 62 676 | 881 540 | 1 142 | 22 840 |
| Bulgaria | 2 189 | 27 998 | 200 | 4 000 |
| Chile | 6 041 | 58 374 | 200 | 4 000 |
| Croatia | 971 | 19 906 | 201 | 4 020 |
| Cyprus | 100 | 4 138 | 100 | 2 000 |
| Czech Republic | 2 639 | 30 831 | 200 | 4 000 |
| Denmark | 1 789 | 52 652 | 198 | 3 600 |
| Estonia | 425 | 8 437 | 200 | 4 000 |
| Finland | 734 | unknown | 152 | 3 040 |
| France | 7 160 | 217 368 | 250 | 5 000 |
| Iceland | 145 | 1 350 | 145 | 1 350 |
| Israel | 2 139 | 140 744 | 154 | 3 080 |
| Italy | 7 917 | 178 385 | 200 | 4 000 |
| Japan | 10 863 | 289 125 | 200 | 4 000 |
| Korea | 3 183 | 110 658 | 200 | 4 000 |
| Latvia | 750 | 88 775 | 150 | 3 000 |
| Malaysia | 2 138 | 132 578 | 200 | 4 000 |
| Mexico | 15 881 | 315 829 | 200 | 4 000 |
| Netherlands | 542 | 78 263 | 150 | 3 000 |
| Norway | 1 226 | 22 997 | 200 | 4 000 |
| Poland | 6 532 | 172 326 | 200 | 4 000 |
| Portugal | 1 318 | 46 088 | 200 | 4 000 |
| Romania | 5 865 | 70 807 | 200 | 4 000 |
| Serbia | 1 083 | 47 833 | 200 | 4 000 |
| Singapore | 197 | 10 383 | 197 | 3 940 |
| Slovak Republic | 1 642 | 27 271 | 200 | 4 000 |
| Spain | 7 322 | 241 177 | 200 | 4 000 |
| Sweden | 1 731 | 301 907 | 200 | 4 000 |
| United States | 68 030 | 815 840 | 200 | 4 000 |
| Abu Dhabi | 268 | 86 726 | 200 | 4 000 |
| (United Arab Emirates) | | | | |
| Alberta (Canada) | 1 174 | 134 527 | 200 | 4 000 |
| England (United | 4 347 | 1 773 534 | 205 | 4 100 |
| Kingdom) | | | | |
| Flanders (Belgium) | 726 | 19 557 | 200 | 4 000 |

Table 29: Overview of the Core Samples in All TALIS 2013 Participating Countries

Source: OECD TALIS Database

APPENDIX C: Extracted Factors and Variables for Leadership Functions

| Organization al Design- | TC2G18D1 School Leadership/ Significant responsibility/ Determining salary increases/ You, as principal | .824 |
|----------------------------|--|-------|
| Principal | TC2G18C1 School Leadership/ Significant responsibility/ Establishing teachers' salaries/ You, as principal | .799 |
| | TC2G18A1 School Leadership/ Significant responsibility/ | .778 |
| | TC2G18B1 School Leadership/ Significant responsibility/ | .752 |
| | Dismissing teachers/ You, as principal | |
| Organization al Design- | TC2G18D5 School Leadership/ Significant responsibility/ Determining salary increases/ <local, national="" or="" regional=""> authority</local,> | 779 |
| Authority | TC2G18C5 School Leadership/ Significant responsibility/ | 768 |
| | Establishing teachers' salaries/ <local, national="" or="" regional=""></local,> | |
| | authority | 751 |
| | Appointing or hiring teachers / closel regional or national | /54 |
| | authority | |
| | TC2G18B5 School Leadership/ Significant responsibility/ | - 701 |
| | Dismissing teachers/ <local. national="" or="" regional=""> authority</local.> | ./01 |
| Organization | TC2G18C2 School Leadership/ Significant responsibility/ | 873 |
| al Design- | Establishing teachers' salaries/ Other members of management team | .075 |
| Management | TC2G18D2 School Leadership/ Significant responsibility/ | 847 |
| Team | Determining salary increases/ Other members of management team | .017 |
| | TC2G18B2 School Leadership/ Significant responsibility/ | .639 |
| | Dismissing teachers/ Other members of management team | |
| | TC2G18A2 School Leadership/ Significant responsibility/ | .423 |
| | Appointing or hiring teachers/ Other members of management team | |
| Organization | TC2G18C4 School Leadership/ Significant responsibility/ | .887 |
| al Design- | Establishing teachers' salaries/ School <governing board=""></governing> | |
| Governing | TC2G18D4 School Leadership/ Significant responsibility/ | .870 |
| Board | Determining salary increases/ School < governing board> | |
| | TC2G18B4 School Leadership/ Significant responsibility/ | .671 |
| | Dismissing teachers/ School <governing board=""></governing> | |
| | TC2G18A4 School Leadership/ Significant responsibility/ | .540 |
| | Appointing or hiring teachers/ School <governing board=""></governing> | |
| Organization | TC2G18D3 School Leadership/ Significant responsibility/ | .857 |
| al Design- | Determining salary increases/ Teachers | |
| Teachers | TC2G18C3 School Leadership/ Significant responsibility/ | .850 |
| | Establishing teachers' salaries/ Teachers | |
| | TC2G18B3 School Leadership/ Significant responsibility/ | .769 |
| | Dismissing teachers/ Teachers | |

Table 30: Factors for Leadership Functions

Table 30 (cont'd)

| | TC2G18A3 School Leadership/ Significant responsibility/ Appointing or hiring teachers/ Teachers | .701 |
|---------------------------|--|------|
| Managing Instruction- | TC2G18I1 School Leadership/ Significant responsibility/ Choosing learning materials/ You, as principal | .793 |
| Principal | TC2G18F1 School Leadership/ Significant responsibility/ Student disciplinary policies/ You, as principal | .790 |
| | TC2G18G1 School Leadership/ Significant responsibility/ Student assessment policies/ You, as principal | .670 |
| | TC2G18J1 School Leadership/ Significant responsibility/ Determining course content/ You, as principal | .595 |
| | TC2G18K1 School Leadership/ Significant responsibility/ Deciding courses offered/ You, as principal | .588 |
| | TC2G18H1 School Leadership/ Significant responsibility/ Approving students for admission/ You, as principal | .572 |
| Managing Instruction- | TC2G18F5 School Leadership/ Significant responsibility/ Student disciplinary policies/ <local, national="" or="" regional=""> authority</local,> | 820 |
| Authority | TC2G18K5 School Leadership/ Significant responsibility/ Deciding courses offered/ <local, national="" or="" regional=""> authority</local,> | 751 |
| | TC2G18I5 School Leadership/ Significant responsibility/ Choosing learning materials/ <local, national="" or="" regional=""> authority</local,> | 716 |
| | TC2G18H5 School Leadership/ Significant responsibility/ Approving students for admission/ <local, national="" or="" regional=""> authority</local,> | 598 |
| | TC2G18J5 School Leadership/ Significant responsibility/ Determining course content/ <local, national="" or="" regional=""> authority</local,> | 551 |
| | TC2G18G5 School Leadership/ Significant responsibility/ Student assessment policies/ <local, national="" or="" regional=""> authority</local,> | 510 |
| Managing Instruction - | TC2G18F2 School Leadership/ Significant responsibility/ Student disciplinary policies/ Other members of management team | .805 |
| Management team | TC2G18I2 School Leadership/ Significant responsibility/ Choosing learning materials/ Other members of management team | .768 |
| | TC2G18G2 School Leadership/ Significant responsibility/ Student assessment policies/ Other members of management team | .728 |
| | TC2G18J2 School Leadership/ Significant responsibility/ Determining course content/ Other members of management team | .673 |
| | TC2G18K2 School Leadership/ Significant responsibility/ Deciding courses offered/ Other members of management team | .632 |
| | TC2G18H2 School Leadership/ Significant responsibility/ Approving students for admission/ Other members of management team | .513 |

Table 30 (cont'd)

| Managing | TC2G18J4 School Leadership/ Significant responsibility/ | .749 |
|---------------|---|-------------|
| Instruction - | Determining course content/ School <governing board=""></governing> | |
| Governing | TC2G18I4 School Leadership/ Significant responsibility/ Choosing | .730 |
| board | learning materials/ School <governing board=""></governing> | |
| | TC2G18G4 School Leadership/ Significant responsibility/ Student | .726 |
| | assessment policies/ School <governing board=""></governing> | |
| | TC2G18K4 School Leadership/ Significant responsibility/ Deciding | .667 |
| | courses offered/ School <governing board=""></governing> | |
| | TC2G18F4 School Leadership/ Significant responsibility/ Student | .572 |
| | disciplinary policies/ School <governing board=""></governing> | • • - |
| | TC2G18H4 School Leadership/ Significant responsibility/ | .397 |
| | Approving students for admission/ School <governing board=""></governing> | |
| Managing | TC2G18H3 School Leadership/ Significant responsibility/ | .824 |
| Instruction- | Approving students for admission/ Teachers | |
| Teachers | TC2G18I3 School Leadership/ Significant responsibility/ Choosing | .820 |
| | learning materials/ Teachers | |
| | TC2G18G3 School Leadership/ Significant responsibility/ Student | .695 |
| | assessment policies/ Teachers | |
| | TC2G18F3 School Leadership/ Significant responsibility/ Student | .652 |
| | disciplinary policies/ Teachers | |
| | TC2G18J3 School Leadership/ Significant responsibility/ | .620 |
| | Determining course content/ Teachers | |
| | TC2G18K3 School Leadership/ Significant responsibility/ Deciding | .568 |
| | courses offered/ Teachers | |
| Developing | TC2G28E2 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .694 |
| People- | Teachers' self-assessments/ You, as principal | |
| Principal | TC2G28F2 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .672 |
| | Discussion about feedback by parents/ You, as principal | 67 0 |
| | TC2G28A2 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .670 |
| | Direct observation of teaching/ You, as principal | <i>cc</i> 1 |
| | 1C2G28C2 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .001 |
| | Assessments of teachers knowledge/ fou, as principal | 501 |
| | Analysis of students' test seeres (New as principal | .591 |
| | TC2C22PD Teacher Formal Approval/Teacher as part of approval/ | 590 |
| | Student surveys / You as principal | .389 |
| D 1 · | Student surveys/ You, as principal | |
| Developing | TC2G28E1 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .692 |
| People- | reachers self-assessments/ External individuals | (70) |
| External | IC2G28D1 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .6/3 |
| marviaual | Analysis of students' test scores/ External individuals | C 40 |
| | 1U2G28A1 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .649 |
| | Direct observation of teaching/ External individuals | |

Table 30 (cont'd)

| | TC2G28C1 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .649 |
|--------------|--|-------|
| | Assessments of teachers knowledge/ External individuals | |
| | TC2G28F1 Teacher Formal Appraisal/ Tasks as part of appraisal/ Discussion about feedback by parents/ External individuals | .641 |
| | TC2G28B1 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .637 |
| | Student surveys/ External individuals | |
| Developing | TC2G28A3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .746 |
| People- | Direct observation of teaching/ Members of school management | |
| Management | TC2G28E3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .736 |
| Team | Teachers' self-assessments/ Members of school management | |
| | TC2G28C3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .701 |
| | Assessments of teachers knowledge/ Members of school | |
| | management | |
| | TC2G28B3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .694 |
| | Student surveys/ Members of school management | |
| | TC2G28F3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .686 |
| | Discussion about feedback by parents/ Members of school | |
| | management | |
| | TC2G28D3 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .676 |
| | Analysis of students' test scores/ Members of school management | |
| Developing | TC2G28D4 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .763 |
| People- | Analysis of students' test scores/ Assigned mentors | |
| Assigned | TC2G28F4 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .742 |
| Mentor | Discussion about feedback by parents/ Assigned mentors | |
| | TC2G28E4 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .721 |
| | Teachers' self-assessments/ Assigned mentors | (70) |
| | TC2G28B4 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .672 |
| | Student surveys/ Assigned mentors | C 1 7 |
| | 1C2G28C4 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .64/ |
| | Assessments of teachers knowledge/ Assigned mentors | (1) |
| | Direct observation of teaching (Assigned montors) | .642 |
| D 1 1 | Direct observation of teaching/ Assigned mentors | 720 |
| Developing | TC2G28E5 Teacher Formal Appraisal/ Tasks as part of appraisal/ | .729 |
| People- | Teachers self-assessments/ Other teachers | 704 |
| Teachers | Discussion shout foodbook by perents/ Other tooshere | .704 |
| | TC2C22D5 Teacher Formal A presidel/ Teacher of a presidel/ | 704 |
| | A nalucia of students' test secrees/ Other teachers | .704 |
| | TC2C29P5 Teacher Formal Approical/ Teals on part of approical/ | 607 |
| | Student surveys/ Other teachers | .007 |
| | TC2C28A5 Teacher Formal Appraical/Tasks as part of appraical/ | 526 |
| | Direct observation of teaching/ Other teachers | .550 |
| | | |

Table 30 (cont'd)

| | TC2G28C5 Teacher Formal Appraisal/ Tasks as part of appraisal/ Assessments of teachers knowledge/ Other teachers | .511 |
|----------|---|------|
| School | TC2G22A School Leadership/ Statements applied to this school/ | .788 |
| Decision | TC2G22D School Leadership/ Statements applied to this school/ I | .558 |
| Making | make the important decisions on my own | |

APPENDIX D: Extracted Factors and Variables for Teacher Quality

| | | Б (|
|-------------------------------------|--|-------------------|
| Factors | Variables | Factor Loading |
| | TT2G34B Teaching in General/ To what extend can you do the following/ Help my students value learning | .939 |
| Instructional | TT2G34A Teaching in General/ To what extend can you do the following/ Get students to believe they can do well in school work | .899 |
| Implementation | TT2G34C Teaching in General/ To what extend can you do the following/ Craft good questions for my students | .696 |
| | TT2G34G Teaching in General/ To what extend can you do the following/ Help students think critically | .689 |
| | TT2G34E Teaching in General/ To what extend can you do the following/ Motivate students who show low interest in school work | .671 |
| | TT2G34I Teaching in General/ To what extend can you do the following/ Calm a student who is disruptive or noisy | .872 |
| Classroom Management | TT2G34D Teaching in General/ To what extend can you do the following/ Control disruptive behavior in the classroom | .833 |
| and Organization | TT2G34H Teaching in General/ To what extend can you do the following/ Get students to follow classroom rules | .796 |
| | TT2G34F Teaching in General/ To what extend can you do the following/ Make my expectations about student behavior clear | .554 |
| | TT2G45C School Climate/ Agreement with what happens/ Most teachers in this school are interested in what students have to say | .840 |
| | TT2G45B School Climate/ Agreement with what happens/ Most teachers in this school believe that students' well-being is important | .837 |
| Teacher- Student Relationship | TT2G45A School Climate/ Agreement with what happens/ In this school, teachers and students usually get on well with each other | .753 |
| | TT2G45D School Climate/ Agreement with what happens/ If a student needs extra assistance, the school provides it | .638 |

Table 31: Extracted Factors and Variables for Teacher Quality
Table 31 (cont'd)

| | TT2G42C Your Teaching/ How often happens/ I give different work to students with difficulties or those who | .741 |
|----------------------|--|------|
| | advance fast TT2G42F Your Teaching/ How often happens/ I check my students' exercise books or homework | .728 |
| | TT2G43F Your Teaching/ Assessing student learning / I observe students when working and provide | .632 |
| Engaging Students | TT2G43E Your Teaching/ Assessing student learning/ I let students evaluate their own progress | .598 |
| Table 30 (cont'd) | TT2G42E Your Teaching/ How often happens/ I let students practice similar tasks until every student has understood | .535 |
| | TT2G43D Your Teaching/ Assessing student learning/ I provide written feedback on student work in addition to a <mark></mark> | .523 |
| | TT2G42B Your Teaching/ How often happens/ Students work in small groups to come up with a joint solution to a problem | .479 |
| | TT2G42D Your Teaching/ How often happens/ I refer to a problem from everyday life or work | .441 |
| | TT2G32B Teaching in General/ Personal beliefs on teaching/ Students learn best by finding solutions to problems on their own | .796 |
| Constructivist | TT2G32C Teaching in General/Personal beliefs on teaching/ Students should be allowed to think of solutions themselves | .787 |
| Beliefs | TT2G32D Teaching in General/ Personal beliefs on teaching/ Thinking and reasoning processes are more important | .663 |
| | TT2G32A Teaching in General/ Personal beliefs on teaching/ My role as a teacher is to facilitate students' own inquiry | .654 |
| | · · | |

Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

APPENDIX E: Variance Analysis Tables for Research Question 2

| | Set | ting Dire | ection | Dev | Developing People | | | Managing Instruction | | |
|-----------|--------------------|--------------------|--------------------|------------------|--------------------|--------------------|--------------------|----------------------|--------------------|--|
| DLPattern | Μ | F | Total | Μ | F | Total | Μ | F | Total | |
| 1 | <mark>535</mark> | <mark>680</mark> | <mark>1,215</mark> | 834 | 782 | 1,616 | 1,030 | 1,082 | 2,112 | |
| % | <mark>18.17</mark> | 21.40 | <mark>19.85</mark> | 28.32 | 24.61 | 26.40 | 34.97 | 34.06 | 34.50 | |
| 2 | 1,303 | 1,245 | 2,548 | 678 | 708 | 1,386 | 482 | 458 | 940 | |
| % | 44.24 | 39.19 | 41.62 | 23.02 | 22.29 | 22.64 | 16.37 | 14.42 | 15.35 | |
| 3 | 294 | 305 | 599 | <mark>504</mark> | <mark>615</mark> | <mark>1,119</mark> | <mark>389</mark> | <mark>490</mark> | <mark>879</mark> | |
| % | 9.98 | 9.60 | 9.78 | 17.11 | <mark>19.36</mark> | 18.28 | 13.21 | 15.42 | <mark>14.36</mark> | |
| 4 | <mark>813</mark> | <mark>947</mark> | <mark>1,760</mark> | <mark>929</mark> | <mark>1,072</mark> | <mark>2,001</mark> | <mark>1,044</mark> | <mark>1,147</mark> | <mark>2,191</mark> | |
| % | 27.61 | <mark>29.81</mark> | 28.75 | 31.54 | <mark>33.74</mark> | 32.69 | 35.45 | <mark>36.10</mark> | <mark>35.79</mark> | |
| Total | 2,945 | 3,177 | 6,122 | 2,945 | 3,177 | 6,122 | 2,945 | 3,177 | 6,122 | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |
| chi2 | 20.266 | | | 14.782 | | | 9.562 | | | |
| Р | 0.000 | | | 0.002 | | | 0.023 | | | |
| | | Hiring | 5 | | Setting S | alary | | | | |
| DLPattern | М | F | Total | М | F | Total | | | | |
| 1 | 1,162 | 1,195 | 2,357 | 1,913 | 2,090 | 4,003 | | | | |
| % | 39.46 | 37.61 | 38.50 | 64.96 | 65.79 | 65.39 | | | | |
| 2 | 1,137 | 1,268 | 2,405 | 919 | 959 | 1,878 | | | | |
| % | 38.61 | 39.91 | 39.28 | 31.21 | 30.19 | 30.68 | | | | |
| 3 | 126 | 170 | 296 | 12 | 13 | 25 | | | | |
| % | 4.28 | 5.35 | 4.84 | 0.41 | 0.41 | 0.41 | | | | |
| 4 | 520 | 544 | 1,064 | 101 | 115 | 216 | | | | |
| % | 17.66 | 17.12 | 17.38 | 3.43 | 3.62 | 3.53 | | | | |
| Total | 2,945 | 3,177 | 6,122 | 2,945 | 3,177 | 6,122 | | | | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | | | | |
| chi2 | 5.896 | | | 0.835 | | | | | | |
| Р | 0.117 | | | 0.841 | | | | | | |

Table 32: Principals' Gender and Distributed Leadership Patterns

Chi-Square Test

| | Setting | Setting Direction | | Develo | Developing People | | | Managing Instruction | | |
|---------|-------------------|--------------------|--------------------|-------------------|--------------------------|-------------------|-------------------|----------------------|-------------------|--|
| | N | Mean | SD | N | Mean | SD | N | Mean | SD | |
| 1 | <mark>1213</mark> | <mark>49.40</mark> | <mark>8.56</mark> | 1608 | 50.66 | 8.23 | <mark>2104</mark> | <mark>50.21</mark> | <mark>8.51</mark> | |
| 2 | <mark>2546</mark> | <mark>51.30</mark> | 7.88 | 1390 | 50.58 | 8.11 | <mark>941</mark> | <mark>50.79</mark> | 8.27 | |
| 3 | 596 | 50.01 | 8.75 | 1113 | 50.06 | 8.37 | 879 | 50.54 | 8.16 | |
| 4 | <mark>1748</mark> | <mark>50.54</mark> | 8.18 | 1940 | 50.80 | 8.20 | <mark>2130</mark> | <mark>50.90</mark> | 7.90 | |
| Total | 6103 | 50.58 | 8.22 | 6055 | 50.58 | 8.22 | 6055 | 50.59 | 8.22 | |
| | df | F | Sig. | df | F | Sig. | df | F | Sig. | |
| Between | 3 | 15.95 | <mark>.000</mark> | 3 | 2.02 | .108 | 3 | 2.928 | <mark>.020</mark> | |
| Within | 6099 | | | 6099 | | | 6099 | | | |
| Total | 6102 | | | 6102 | | | 6102 | | | |
| | Н | liring Pe | ople | Setting Salary | | | | | | |
| 1 | <mark>2350</mark> | <mark>50.11</mark> | <mark>8.593</mark> | <mark>3998</mark> | <mark>50.15</mark> | 8.394 | | | | |
| 2 | <mark>2406</mark> | <mark>51.13</mark> | 7.922 | 1875 | 51.33 | 7.854 | | | | |
| 3 | 295 | 48.87 | 8.540 | 25 | 49.36 | 7.187 | | | | |
| 4 | <mark>1004</mark> | <mark>50.79</mark> | 7.786 | <mark>157</mark> | <mark>52.94</mark> | 6.965 | | | | |
| Total | 6055 | 50.59 | 8.216 | 6055 | 50.59 | 8.216 | | | | |
| | df | F | Sig. | df | F | Sig. | | | | |
| Between | 3 | 10.150 | <mark>.000</mark> | 3 | 13.327 | <mark>.000</mark> | | | · | |
| Within | 6099 | | | 6099 | | | | | | |
| Total | 6102 | | | 6102 | | | | | | |

Table 33: Principals' Age and Distributed Leadership Pattern

| | Settin Direc | ng tion | Developing People | | Managing Instruction | | Hiring People | | Setting Salary | |
|--------------------|-------------------|-----------------------|----------------------|-----------------------|-------------------------|----------|-------------------|-----------------------|-------------------|-----------|
| | Ν | Rank Sum | Ν | Rank Sum | N | Rank Sum | N | Rank Sum | N | Rank Sum |
| 1 | 1200 | 3.63e+06 | 1616 | 4.85e+06 | 2096 | 6.33e+06 | <mark>2332</mark> | 7.10e+06 | <mark>3977</mark> | 1.20e+07 |
| 2 | <mark>2546</mark> | <mark>7.86e+06</mark> | 1386 | 4.27e+06 | 939 | 2.85e+06 | <mark>2406</mark> | <mark>7.47e+06</mark> | <mark>1878</mark> | 5.80e+06 |
| 3 | 598 | 1.80e+06 | 1107 | 3.34e+06 | 877 | 2.67e+06 | 294 | 852123.50 | 25 | 82308.50 |
| 4 | <mark>1747</mark> | <mark>5.26e+06</mark> | <mark>1982</mark> | <mark>6.10e+06</mark> | 2179 | 6.70e+06 | 1008 | 3.14e+06 | 160 | 621985.50 |
| DF | 3 | | 3 | | 3 | | 3 | | 3 | - |
| Ch2 with Tie | 12.13 | 2 | 12.28 | 9 | 5.612 | 2 | 32.51 | 2 | 13.02 | .6 |
| Р | 0.007 | | 0.007 | , | 0.132 | 2 | 0.000 |) | 0.005 | |

Table 34: Principals' Education and Distributed Leadership Pattern

Kruskal-Wallis equality-of-populations rank test

| Table 35: Principals' | Experience as a | Principal and | Distributed] | Leadership | Pattern |
|-----------------------|-----------------|---------------|---------------|------------|---------|
| | 1 | | | | |

| | Setting Direction | | Developing People | | Managing Instruction | | Hiring People | | Setting Salary | |
|--------------------|----------------------|-----------------------|----------------------|-----------------------|-------------------------|-----------------------|-------------------|-----------------------|-------------------|-----------------------|
| | Ν | Rank Sum | Ν | Rank Sum | N | Rank Sum | N | Rank Sum | Ν | Rank Sum |
| 1 | 1082 | 2.81e+06 | <mark>1541</mark> | <mark>4.41e+06</mark> | <mark>1931</mark> | 5.24e+06 | <mark>2143</mark> | <mark>5.51e+06</mark> | <mark>3704</mark> | <mark>9.96e+06</mark> |
| 2 | <mark>2456</mark> | 7.32e+06 | 1316 | 3.93e+06 | 883 | 2.50e+06 | <mark>2322</mark> | <mark>7.24e+06</mark> | <mark>1824</mark> | <mark>5.84e+06</mark> |
| 3 | 551 | 1.45e+06 | 1020 | 2.77e+06 | 829 | 2.41e+06 | 269 | 713656.50 | 21 | 66457.00 |
| 4 | <mark>1646</mark> | <mark>4.87e+06</mark> | <mark>1858</mark> | <mark>5.35e+06</mark> | <mark>2092</mark> | <mark>6.30e+06</mark> | <mark>1001</mark> | <mark>2.99e+06</mark> | 186 | 574753.50 |
| DF | 3 | - | 3 | - | 3 | | 3 | · · · · | 3 | |
| Ch2 with Tie | 56.740 | 5 | 15.59 | 8 | 33.23 7 | } | 132.7 | 01 | 121.2 | .87 |
| Р | 0.000 | | 0.001 | | 0.000 |) | 0.000 | | 0.000 |) |

Kruskal-Wallis equality-of-populations rank test

| | Setting | g Directi | ion | Develo | ping Pe | ople | Managing Instruction | | | |
|-----------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|--------------------|--------------------|--|
| DLPattern | PRI | PUB | Total | PRI | PUB | Total | PRI | PUB | Total | |
| 1 | 34 | 1,184 | 1,218 | 206 | 1,418 | 1,624 | <mark>189</mark> | <mark>1,929</mark> | <mark>2,118</mark> | |
| % | 3.90 | 22.57 | 19.91 | 23.65 | 27.04 | 26.55 | <mark>21.70</mark> | <mark>36.78</mark> | <mark>34.63</mark> | |
| 2 | <mark>459</mark> | <mark>2,098</mark> | <mark>2,557</mark> | 207 | 1,183 | 1,390 | 225 | 722 | 947 | |
| % | <mark>52.70</mark> | <mark>40.00</mark> | <mark>41.81</mark> | 23.77 | 22.55 | 22.73 | 25.83 | 13.77 | 15.48 | |
| 3 | 102 | 500 | 602 | 157 | 960 | 1,117 | 82 | 800 | 882 | |
| % | 11.71 | 9.53 | 9.84 | 18.03 | 18.30 | 18.26 | 9.41 | 15.25 | 14.42 | |
| 4 | <mark>276</mark> | <mark>1,463</mark> | <mark>1,739</mark> | 301 | 1,684 | 1,985 | <mark>375</mark> | <mark>1,794</mark> | <mark>2,169</mark> | |
| % | <mark>31.69</mark> | <mark>27.89</mark> | <mark>28.43</mark> | 34.56 | 32.11 | 32.46 | <mark>43.05</mark> | <mark>34.20</mark> | <mark>35.46</mark> | |
| Total | 871 | 5,245 | 6,116 | 871 | 5,245 | 6,116 | 871 | 5,245 | 6,116 | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |
| chi2 | 166.933 | | | | 5.118 | | 153.435 | | | |
| Р | | 0.000 | | | 0.163 | | | 0.000 | | |
| DLPattern | | Hirin | | Se | etting Sa | lary | | | | |
| | PRI | PUB | Total | PRI | PUB | Total | | | | |
| 1 | <mark>94</mark> | <mark>2,270</mark> | <mark>2,364</mark> | <mark>307</mark> | <mark>3,702</mark> | <mark>4,009</mark> | | | | |
| % | <mark>10.79</mark> | <mark>43.28</mark> | <mark>38.65</mark> | <mark>35.25</mark> | <mark>70.58</mark> | <mark>65.55</mark> | | | | |
| 2 | <mark>449</mark> | <mark>1,963</mark> | <mark>2,412</mark> | <mark>519</mark> | <mark>1,368</mark> | <mark>1,887</mark> | | | | |
| % | <mark>51.55</mark> | <mark>37.43</mark> | <mark>39.44</mark> | <mark>59.59</mark> | <mark>26.08</mark> | <mark>30.85</mark> | | | | |
| 3 | 61 | 236 | 297 | 6 | 19 | 25 | | | | |
| % | 7.00 | 4.50 | 4.86 | 0.69 | 0.36 | 0.41 | | | | |
| 4 | <mark>267</mark> | <mark>776</mark> | <mark>1,043</mark> | 39 | 156 | 195 | | | | |
| % | <mark>30.65</mark> | <mark>14.80</mark> | <mark>17.05</mark> | 4.48 | 2.97 | 3.19 | | | | |
| Total | 871 | 5,245 | 6,116 | 871 | 5,245 | 6,116 | | | | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | | | | |
| chi2 | | 361.55 | 0 | | 421.29 | 1 | | | | |
| Р | | 0.000 | | | 0.000 | | | | | |

Table 36: School Management Type and Distributed Leadership Pattern

Chi-square test

| | Setting | g Directi | on | Develo | ping Pe | ople | Manag | Managing Instruction | | |
|-----------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|--------------------|--|
| DLPattern | <50 | >50 | Total | <50 | >50 | Total | <50 | >50 | Total | |
| 1 | <mark>172</mark> | <mark>1,041</mark> | <mark>1,213</mark> | <mark>183</mark> | <mark>1,438</mark> | <mark>1,621</mark> | <mark>267</mark> | <mark>1,843</mark> | <mark>2,110</mark> | |
| % | 21.55 | <mark>19.65</mark> | <mark>19.90</mark> | <mark>22.93</mark> | 27.14 | <mark>26.59</mark> | <mark>33.46</mark> | <mark>34.78</mark> | <mark>34.61</mark> | |
| 2 | <mark>323</mark> | <mark>2,226</mark> | <mark>2,549</mark> | <mark>201</mark> | <mark>1,183</mark> | <mark>1,384</mark> | 163 | 780 | 943 | |
| % | <mark>40.48</mark> | 42.01 | <mark>41.81</mark> | <mark>25.19</mark> | 22.32 | <mark>22.70</mark> | 20.43 | 14.72 | 15.47 | |
| 3 | 102 | 500 | 602 | <mark>162</mark> | <mark>951</mark> | <mark>1,113</mark> | 89 | 790 | 879 | |
| % | 12.78 | 9.44 | 9.87 | 20.30 | 17.95 | 18.25 | 11.15 | 14.91 | 14.42 | |
| 4 | <mark>201</mark> | <mark>1,532</mark> | <mark>1,733</mark> | 252 | 1,727 | 1,979 | <mark>279</mark> | <mark>1,886</mark> | <mark>2,165</mark> | |
| % | <mark>25.19</mark> | <mark>28.91</mark> | 28.42 | 31.58 | 32.59 | 32.46 | <mark>34.96</mark> | <mark>35.59</mark> | 35.51 | |
| Total | 798 | 5,299 | 6,097 | 798 | 5,299 | 6,097 | 798 | 5,299 | 6,097 | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | |
| chi2 | | 12.907 | 7 | | 9.441 | | | 21.814 | 1 | |
| Р | | 0.005 | | | 0.024 | | | 0.000 | | |
| | | Hirin | 5 | Se | etting Sa | lary | | | | |
| DLPattern | <50 | >50 | Total | <50 | >50 | Total | | | | |
| 1 | <mark>246</mark> | <mark>2,112</mark> | <mark>2,358</mark> | <mark>439</mark> | <mark>3,564</mark> | <mark>4,003</mark> | | | | |
| % | <mark>30.83</mark> | <mark>39.86</mark> | <mark>38.67</mark> | 55.01 | 67.26 | <mark>65.66</mark> | | | | |
| 2 | <mark>359</mark> | <mark>2,045</mark> | <mark>2,404</mark> | <mark>317</mark> | <mark>1,560</mark> | <mark>1,877</mark> | | | | |
| % | <mark>44.99</mark> | <mark>38.59</mark> | <mark>39.43</mark> | <mark>39.72</mark> | 29.44 | <mark>30.79</mark> | | | | |
| 3 | 49 | 248 | 297 | 5 | 20 | 25 | | | | |
| % | 6.14 | 4.68 | 4.87 | 0.63 | 0.38 | 0.41 | | | | |
| 4 | 144 | 894 | 1,038 | 37 | 155 | 192 | | | | |
| % | 18.05 | 16.87 | 17.02 | 4.64 | 2.93 | 3.15 | | | | |
| Total | 798 | 5,299 | 6,097 | 798 | 5,299 | 6,097 | - | - | - | |
| % | 100 | 100 | 100 | 100 | 100 | 100 | | | | |
| chi2 | 25.413 | | | | 47.171 | | | | | |
| P | | 0.000 | | | 0.000 | | | | | |

Table 37: School Public Funding and Distributed Leadership Pattern

| APPENDIX F: Formal Leaders | 'Impact on Te | eaching Quality a | cross 32 Countries |
|-----------------------------------|---------------|-------------------|--------------------|
|-----------------------------------|---------------|-------------------|--------------------|

| | AAD | AUS | BFL | BGR | BRA | CAB |
|---------------------|-------------|------------------|---------|---------------|--------------------------------|----------|
| Intercept | -0.110 | -0.604 | -0.192 | 1.051* | 0.224 | -0.835 |
| | (0.464) | (0.649) | (0.229) | (0.480) | (0.226) | (0.477) |
| Independent Variat | oles | | | | | |
| Devpeople_FOR | -0.014 | -0.141 | -0.075 | 0.003 | 0.006 | 0.094 |
| | (0.071) | (0.074) | (0.065) | (0.097) | (0.046) | (0.073) |
| Hire_FOR | -0.145 | -0.123 | 0.015 | 0.193 | 0.052 | -0.001 |
| | (0.123) | (0.163) | (0.079) | (0.257) | (0.077) | (0.115) |
| ManInstruct_FOR | 0.040 | 0.006 | -0.100 | -0.011 | 0.004 | 0.078 |
| | (0.079) | (0.108) | (0.069) | (0.072) | (0.056) | (0.107) |
| SetDirection_FOR | -0.038 | 0.230 | -0.027 | -0.083 | -0.093 | -0.052 |
| | (0.113) | (0.119) | (0.072) | (0.128) | (0.064) | (0.110) |
| SetSalary_FOR | 0.225 | -0.210 | -0.175 | -0.238 | -0.051 | 1.024 |
| | (0.187) | (0.185) | (0.115) | (0.133) | (0.176) | (0.568) |
| Principal and Schoo | ol Controls | | | | | |
| Gender | 0.018 | 0.063 | 0.090 | 0.018 | -0.070 | 0.242* |
| | (0.112) | (0.151) | (0.069) | (0.116) | (0.087) | (0.107) |
| Age | 0.011 | -0.019* | 0.004 | -0.013 | -0.007 | -0.005 |
| - | (0.007) | (0.009) | (0.005) | (0.010) | (0.005) | (0.010) |
| Education | -0.104 | 0.544* | -0.085 | -0.016 | 0.073 | 0.064 |
| | (0.159) | (0.239) | (0.064) | (0.178) | (0.080) | (0.282) |
| Experience | -0.005 | 0.006 | -0.011 | 0.016* | 0.008 | 0.002 |
| - | (0.007) | (0.011) | (0.008) | (0.006) | (0.005) | (0.010) |
| Employstatus | 0.566** | 0.206 | 0.011 | 0.000 | 0.001 | 0.336 |
| | (0.180) | (0.232) | (0.252) | (.) | (0.115) | (0.187) |
| Location | -0.147 | -0.034 | 0.018 | 0.193 | -0.255** | 0.425*** |
| | (0.096) | (0.176) | (0.074) | (0.118) | (0.096) | (0.118) |
| Managetype | 0.055 | -0.164 | 0.116 | - 1 112*** | -0.204 | 0.818** |
| | (0.156) | (0.174) | (0.068) | (0.237) | (0.333) | (0.296) |
| Publicfund | 0.150) | -0 560** | 0.000 | (0.237) | -0 3/18 | 0.195 |
| | (0.107) | (0.209) | () | () | -0.3 - 0 (0.276) | (0.175) |
| Size | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 |
| | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) | (0,000) |
| Immigrant | -0.038 | (0.000) 0.1/0 | (0.000) | (0.000) | (0.000) | 0.000) |
| | (0.030) | (0.1+0) | (0.037) | (0.007) | (0.020) | (0.050) |
| LowSES | (0.031) | (0.092) | (0.047) | 0.043) | 0.009) | (0.003) |
| LUNDED | (0.019) | 0.034 | -0.018 | -0.003 | (0.013) | -0.11/ |
| Teacher Controls | (0.041) | (0.078) | (0.049) | (0.034) | (0.030) | (0.007) |
| | | | | | | |

Table 38: Formal Leaders' Impact on Teaching Quality across 32 Countries

| Table 38 (cont'd) | | | | | | | | | | |
|--|---|--|--|---|--|--|--|--|--|--|
| Gender | 0.043 | 0.459*** | 0.226** | -0.123 | 0.202 | 0.227* | | | | |
| | (0.114) | (0.122) | (0.081) | (0.096) | (0.108) | (0.102) | | | | |
| Age | 0.000 | -0.013 | 0.006 | -0.003 | 0.013* | 0.021** | | | | |
| | (0.010) | (0.010) | (0.006) | (0.007) | (0.006) | (0.008) | | | | |
| Employstatus | 0.675 | 0.221 | 0.196* | 0.240 | 0.123 | 0.468* | | | | |
| | (0.403) | (0.148) | (0.094) | (0.206) | (0.083) | (0.190) | | | | |
| Experience | 0.025* | 0.036** | 0.006 | -0.008 | 0.003 | 0.009 | | | | |
| | (0.012) | (0.012) | (0.006) | (0.006) | (0.007) | (0.011) | | | | |
| Tenure | 0.047 | 0.320 | 0.391*** | 0.053 | -0.230** | 0.114 | | | | |
| | (0.088) | (0.230) | (0.107) | (0.140) | (0.087) | (0.134) | | | | |
| Education | 0.040 | 0.079 | -0.060 | -0.039 | 0.049 | 0.013 | | | | |
| | (0.120) | (0.534) | (0.103) | (0.148) | (0.104) | (0.272) | | | | |
| Training | -0.004 | -0.485 | 0.228 | 0.480 | 0.249* | -0.322 | | | | |
| | (0.131) | (0.329) | (0.294) | (0.383) | (0.097) | (0.487) | | | | |
| Variance Compone | nt | | | | | | | | | |
| Between | 0.035*** | 0.007*** | 0.000 | 0.019*** | 0.022*** | 0.010*** | | | | |
| | (0.028) | (0.006) | (0.002) | (0.009) | (0.005) | (0.005) | | | | |
| Within | 0.497*** | 0.377*** | 0.331*** | 0.381*** | 0.353*** | 0.392*** | | | | |
| | (0.020) | (0.023) | (0.010) | (0.016) | (0.012) | (0.017) | | | | |
| Ν | 1582 | 1507 | 2270 | 1915 | 5492 | 1340 | | | | |
| | CHL | CZE | DNK | ENG | ESP | EST | | | | |
| Intercept | -0.313 | -0.261 | 0.347 | -0.219 | -0.591 | -0.474* | | | | |
| - | | (0, 005) | (0.261) | (0.421) | (0.356) | (0.238) | | | | |
| (0.476) (0.225) (0.261) (0.421) (0.356) (0.238) | | | | | | | | | | |
| Independent Varial | (0.476) oles | (0.225) | (0.201) | / | | | | | | |
| Independent Varial Devpeople_FOR | (0.476) oles -0.171 | 0.059 | 0.024 | -0.035 | 0.013 | 0.008 | | | | |
| Independent Varial Devpeople_FOR | (0.476) bles -0.171 (0.144) | (0.225) 0.059 (0.057) | 0.024 (0.068) | -0.035 (0.097) | 0.013 (0.069) | 0.008 (0.052) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR | (0.476) bles -0.171 (0.144) -0.142 | 0.059 (0.057) 0.014 | 0.024 (0.068) -0.062 | -0.035 (0.097) 0.018 | 0.013 (0.069) -0.015 | 0.008 (0.052) 0.076 | | | | |
| Independent Varial Devpeople_FOR Hire_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) | (0.225) 0.059 (0.057) 0.014 (0.080) | 0.024 (0.068) -0.062 (0.094) | -0.035 (0.097) 0.018 (0.143) | 0.013 (0.069) -0.015 (0.077) | 0.008 (0.052) 0.076 (0.085) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* | 0.059 (0.057) 0.014 (0.080) -0.039 | 0.024 (0.068) -0.062 (0.094) -0.092 | -0.035 (0.097) 0.018 (0.143) 0.148 | 0.013 (0.069) -0.015 (0.077) -0.000 | 0.008 (0.052) 0.076 (0.085) -0.010 | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) | 0.059 (0.057) 0.014 (0.080) -0.039 (0.063) | $\begin{array}{c} (0.201) \\ \hline 0.024 \\ (0.068) \\ -0.062 \\ (0.094) \\ -0.092 \\ (0.087) \end{array}$ | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 | 0.059 (0.057) 0.014 (0.080) -0.039 (0.063) 0.061 | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) | $\begin{array}{c} (0.225) \\ \hline 0.059 \\ (0.057) \\ 0.014 \\ (0.080) \\ -0.039 \\ (0.063) \\ 0.061 \\ (0.104) \end{array}$ | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) 0.232 | $\begin{array}{c} (0.225) \\ \hline 0.059 \\ (0.057) \\ 0.014 \\ (0.080) \\ -0.039 \\ (0.063) \\ 0.061 \\ (0.104) \\ 0.079 \end{array}$ | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) 0.030 | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR | (0.476) (0.476) -0.171 (0.144) -0.142 (0.128) $0.285*$ (0.116) -0.225 (0.241) 0.232 (0.232) | $\begin{array}{c} (0.225) \\ \hline 0.059 \\ (0.057) \\ 0.014 \\ (0.080) \\ -0.039 \\ (0.063) \\ 0.061 \\ (0.104) \\ 0.079 \\ (0.137) \end{array}$ | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) 0.030 (0.079) | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 (0.137) | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 (0.105) | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 (0.108) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and School | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) 0.232 (0.232) bl Controls | $\begin{array}{c} (0.225) \\ \hline 0.059 \\ (0.057) \\ 0.014 \\ (0.080) \\ -0.039 \\ (0.063) \\ 0.061 \\ (0.104) \\ 0.079 \\ (0.137) \end{array}$ | $\begin{array}{c} 0.024\\ (0.068)\\ -0.062\\ (0.094)\\ -0.092\\ (0.087)\\ \hline 0.264*\\ (0.114)\\ 0.030\\ (0.079) \end{array}$ | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 (0.137) | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 (0.105) | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 (0.108) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and School Gender | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) 0.232 (0.232) bl Controls 0.180 | 0.059 (0.057) 0.014 (0.080) -0.039 (0.063) 0.061 (0.104) 0.079 (0.137) 0.078 | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) 0.030 (0.079) | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 (0.137) 0.244* | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 (0.105) 0.144 | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 (0.108) 0.066 | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and School Gender | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) 0.232 (0.232) bl Controls 0.180 (0.172) | 0.059 (0.057) 0.014 (0.080) -0.039 (0.063) 0.061 (0.104) 0.079 (0.137) 0.078 (0.078) | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) 0.030 (0.079) 0.003 (0.104) | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 (0.137) 0.244* (0.097) | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 (0.105) 0.144 (0.079) | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 (0.108) 0.066 (0.070) | | | | |
| Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and School Gender Age | (0.476) bles -0.171 (0.144) -0.142 (0.128) 0.285* (0.116) -0.225 (0.241) 0.232 (0.232) bl Controls 0.180 (0.172) -0.008 | 0.059 (0.057) 0.014 (0.080) -0.039 (0.063) 0.061 (0.104) 0.079 (0.137) 0.078 (0.078) -0.011 | 0.024 (0.068) -0.062 (0.094) -0.092 (0.087) 0.264* (0.114) 0.030 (0.079) 0.003 (0.104) 0.006 | -0.035 (0.097) 0.018 (0.143) 0.148 (0.082) 0.176 (0.121) -0.131 (0.137) 0.244* (0.097) -0.003 | 0.013 (0.069) -0.015 (0.077) -0.000 (0.061) -0.108 (0.073) -0.010 (0.105) 0.144 (0.079) -0.007 | 0.008 (0.052) 0.076 (0.085) -0.010 (0.058) 0.086 (0.102) -0.134 (0.108) 0.066 (0.070) -0.000 | | | | |

| Table 38 (cont'd) | | | | | | |
|-------------------------|----------|----------|----------|----------|----------|----------|
| Education | 0.136 | 0.026 | - | 0.086 | 0.013 | 0.188 |
| | -0.130 | -0.020 | 0.650*** | -0.000 | -0.015 | 0.188 |
| | (0.275) | (0.098) | (0.107) | (0.170) | (0.111) | (0.145) |
| Experience | 0.025* | 0.004 | 0.014 | 0.008 | -0.002 | 0.004 |
| | (0.012) | (0.006) | (0.008) | (0.010) | (0.008) | (0.004) |
| Employstatus | 0.645 | 0.225 | 0.000 | -0.411** | -0.234** | -0.018 |
| | (0.370) | (0.341) | (.) | (0.153) | (0.083) | (0.123) |
| Location | 0.603* | 0.020 | 0.109 | -0.116 | -0.185 | 0.073 |
| | (0.260) | (0.077) | (0.092) | (0.099) | (0.111) | (0.095) |
| Managetype | 0.708** | -0.264 | -0.339** | -0.210* | -0.389** | 0.045 |
| | (0.261) | (0.144) | (0.129) | (0.095) | (0.134) | (0.171) |
| Publicfund | 0.044 | -0.160 | 0.000 | 0.099 | 0.148 | 0.056 |
| | (0.260) | (0.088) | (.) | (0.140) | (0.115) | (0.124) |
| Size | 0.000 | -0.000 | -0.000 | 0.000 | 0.000* | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | 0.569** | 0.108 | 0.084 | 0.057 | -0.090 | 0.055 |
| | (0.206) | (0.083) | (0.055) | (0.039) | (0.047) | (0.036) |
| LowSES | 0.055 | -0.067 | -0.128* | 0.010 | 0.032 | 0.028 |
| | (0.080) | (0.053) | (0.065) | (0.052) | (0.048) | (0.043) |
| Teacher Controls | | | | | | |
| Gender | 0.403** | 0.063 | 0.533*** | 0.268** | 0.324*** | 0.295** |
| | (0.125) | (0.071) | (0.084) | (0.083) | (0.092) | (0.093) |
| Age | 0.013 | -0.008 | 0.004 | -0.007 | 0.006 | -0.017** |
| | (0.012) | (0.006) | (0.008) | (0.007) | (0.011) | (0.005) |
| Employstatus | 0.329* | 0.095 | 0.352* | 0.515*** | 0.259 | 0.118 |
| | (0.155) | (0.089) | (0.167) | (0.136) | (0.150) | (0.078) |
| Experience | -0.003 | 0.021*** | 0.016* | 0.022** | -0.001 | 0.012** |
| | (0.013) | (0.006) | (0.007) | (0.008) | (0.010) | (0.005) |
| Tenure | -0.153 | 0.281** | 0.410* | 0.580** | -0.013 | 0.200* |
| | (0.186) | (0.101) | (0.165) | (0.183) | (0.123) | (0.093) |
| Education | -0.053 | -0.032 | 0.024 | -0.004 | -0.024 | -0.062 |
| | (0.147) | (0.068) | (0.137) | (0.225) | (0.098) | (0.064) |
| Training | -0.027 | 0.093 | 0.338 | 0.074 | 0.463* | 0.174 |
| | (0.231) | (0.078) | (0.242) | (0.190) | (0.220) | (0.132) |
| Variance Compone | nt | | | | | |
| Between | 0.034*** | 0.015*** | 0.010*** | 0.008*** | 0.007*** | 0.006*** |
| | (0.014) | (0.005) | (0.006) | (0.004) | (0.004) | (0.004) |
| Within | 0.458*** | 0.321*** | 0.313*** | 0.388*** | 0.351*** | 0.354*** |
| | (0.032) | (0.010) | (0.017) | (0.025) | (0.015) | (0.014) |
| N | 716 | 3020 | 1122 | 2149 | 1983 | 2822 |

| Table 38 (cont'd) | | | | | | |
|-------------------------|-------------|---------|---------------|---------------|---------|---------------|
| | FIN | FRA | HRV | ISR | ITA | JPN |
| Intercept | -0.423 | 0.221 | -0.182 | -0.194 | -0.266 | - 1 633*** |
| | (0.454) | (0.288) | (0.331) | (0.440) | (0.452) | (0.388) |
| Independent Varial | oles | × / | × / | × / | × / | · / |
| Devpeople_FOR | -0.006 | -0.091 | -0.001 | 0.122 | 0.017 | -0.042 |
| I I – | (0.092) | (0.075) | (0.045) | (0.076) | (0.115) | (0.051) |
| Hire_FOR | 0.197 | -0.010 | 0.128 | - 0.352*** | -0.133 | -0.093 |
| | (0.136) | (0.108) | (0.078) | (0.087) | (0.136) | (0.105) |
| ManInstruct_FOR | -0.126 | -0.011 | 0.031 | 0.171* | 0.049 | 0.072 |
| | (0.093) | (0.065) | (0.050) | (0.074) | (0.089) | (0.059) |
| SetDirection_FOR | 0.035 | 0.006 | -0.012 | -0.027 | 0.030 | -0.044 |
| | (0.140) | (0.059) | (0.066) | (0.083) | (0.137) | (0.073) |
| SetSalary_FOR | -0.015 | 0.238 | 0.105 | 0.074 | 0.192 | 0.184 |
| | (0.142) | (0.302) | (0.164) | (0.132) | (0.263) | (0.116) |
| Principal and Schoo | ol Controls | | | | | |
| Gender | 0.018 | -0.062 | 0.098 | 0.191 | -0.162 | -0.032 |
| | (0.125) | (0.082) | (0.071) | (0.127) | (0.136) | (0.118) |
| Age | 0.010 | 0.006 | 0.001 | 0.005 | 0.016 | 0.019 |
| | (0.008) | (0.006) | (0.005) | (0.008) | (0.010) | (0.015) |
| Education | 0.387 | 0.004 | - 0.383*** | 0.135 | 0.191 | 0.052 |
| | (0.211) | (0.080) | (0.084) | (0.149) | (0.315) | (0.082) |
| Experience | -0.002 | 0.001 | -0.005 | -0.017* | -0.028* | -0.018 |
| | (0.009) | (0.006) | (0.006) | (0.008) | (0.011) | (0.013) |
| Employstatus | 0.261 | 0.000 | 0.000 | -0.574* | 0.000 | 0.000 |
| | (0.389) | (.) | (.) | (0.242) | (.) | (.) |
| Location | 0.049 | -0.016 | 0.120 | -0.007 | 0.304* | -0.203 |
| | (0.140) | (0.078) | (0.074) | (0.100) | (0.123) | (0.162) |
| Managetype | -0.105 | -0.116 | -0.207 | 0.017 | -0.050 | 0.505** |
| | (0.369) | (0.158) | (0.289) | (0.149) | (0.364) | (0.179) |
| Publicfund | -0.060 | -0.130 | 0.183 | 0.023 | 0.360** | -0.462* |
| G! | (0.125) | (0.155) | (0.118) | (0.106) | (0.122) | (0.230) |
| Size | 0.001* | -0.000 | 0.000 | 0.000** | -0.001* | 0.000* |
| T | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | 0.025 | -0.00/ | -0.046 | -0.088 | -0.162 | 0.012 |
| Lowers | (0.076) | (0.053) | (0.039) | (0.056) | (0.119) | (0.066) |
| LOWSES | -0.189** | -0.042 | -0.007 | -0.001 | -0.052 | - 0.191*** |
| | (0.067) | (0.049) | (0.051) | (0.046) | (0.095) | (0.050) |
| Teacher Controls | | | | | | |

| Table 38 (cont'd) | | | | | | |
|---|---|---|--|---|---|--|
| Gender | 0.115 | 0 105** | 0.206* | 0.123 | 0 582*** | - |
| | 0.115 | 0.175 | 0.200 | 0.125 | 0.562 | 0.459*** |
| | (0.096) | (0.070) | (0.083) | (0.103) | (0.110) | (0.064) |
| Age | -0.006 | 0.011 | -0.009 | -0.016 | 0.011 | 0.024** |
| | (0.008) | (0.007) | (0.007) | (0.009) | (0.011) | (0.008) |
| Employstatus | -0.052 | 0.154 | -0.204* | 0.199* | 0.332 | 0.042 |
| | (0.168) | (0.095) | (0.103) | (0.100) | (0.197) | (0.188) |
| Experience | 0.017 | 0.010 | 0.036*** | 0.020* | 0.014 | -0.003 |
| | (0.009) | (0.007) | (0.007) | (0.010) | (0.010) | (0.008) |
| Tenure | -0.006 | -0.277 | 0.121 | 0.281 | -0.268 | 0.124 |
| | (0.098) | (0.192) | (0.132) | (0.185) | (0.242) | (0.086) |
| Education | 0.109 | 0.029 | 0.076 | 0.241 | -0.066 | -0.298* |
| | (0.165) | (0.087) | (0.109) | (0.214) | (0.091) | (0.146) |
| Training | -0.038 | 0.022 | 0.326* | -0.151 | 0.140 | 0.078 |
| | (0.186) | (0.102) | (0.151) | (0.181) | (0.140) | (0.112) |
| Variance Compone | nt | | | | | |
| Between | 0.009*** | 0.011*** | 0.001* | 0.019*** | 0.001* | 0.015*** |
| | (0.004) | (0.004) | (0.002) | (0.006) | (0.005) | (0.003) |
| Within | 0.398*** | 0.294*** | 0.308*** | 0.454*** | 0.324*** | 0.336*** |
| | (0.015) | (0.010) | (0.011) | (0.021) | (0.031) | (0.012) |
| | | | | | | |
| N | 1900 | 2308 | 2392 | 2641 | 882 | 3153 |
| N | 1900 KOR | 2308 LVA | 2392 MEX | 2641 MYS | 882 NLD | 3153 NOR |
| N Intercept | 1900 KOR -0.043 | 2308 LVA -0.735** | 2392 MEX -0.001 | 2641 MYS 0.685 | 882 NLD -0.397 | 3153 NOR 0.098 |
| N Intercept | 1900 KOR -0.043 (0.950) | 2308 LVA -0.735** (0.277) | 2392 MEX -0.001 (0.302) | 2641 MYS 0.685 (0.811) | 882 NLD -0.397 (0.597) | 3153 NOR 0.098 (0.288) |
| N Intercept Independent Varial | 1900 KOR -0.043 (0.950) Dles | 2308 LVA -0.735** (0.277) | 2392 MEX -0.001 (0.302) | 2641 MYS 0.685 (0.811) | 882 NLD -0.397 (0.597) | 3153 NOR 0.098 (0.288) |
| N Intercept Independent Varial Devpeople FOR | 1900 KOR -0.043 (0.950) bles -0.035 | 2308 LVA -0.735** (0.277) 0.018 | 2392 MEX -0.001 (0.302) -0.176* | 2641 MYS 0.685 (0.811) 0.017 | 882 NLD -0.397 (0.597) -0.211* | 3153 NOR 0.098 (0.288) 0.280** |
| N Intercept Independent Varial Devpeople_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) | 2308 LVA -0.735** (0.277) 0.018 (0.129) | 2392 MEX -0.001 (0.302) -0.176* (0.073) | 2641 MYS 0.685 (0.811) 0.017 (0.075) | 882 NLD -0.397 (0.597) -0.211* (0.106) | 3153 NOR 0.098 (0.288) 0.280** (0.094) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) -0.099 |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.094) -0.195* (0.080) -0.099 (0.137) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) -0.566* | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) -0.099 (0.137) -0.110 |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) -0.566* (0.277) | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 (0.089) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 (0.182) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 (0.154) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 (0.123) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.094) -0.195* (0.080) -0.099 (0.137) -0.110 (0.215) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and School | 1900 KOR -0.043 (0.950) bles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) -0.566* (0.277) bl Controls | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 (0.089) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 (0.182) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 (0.154) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 (0.123) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) -0.099 (0.137) -0.110 (0.215) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and Schoo Gender | 1900 KOR -0.043 (0.950) oles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) -0.566* (0.277) ol Controls -0.108 | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 (0.089) -0.006 | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 (0.182) 0.015 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 (0.154) 0.032 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 (0.123) -0.072 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.044) -0.195* (0.080) -0.099 (0.137) -0.110 (0.215) 0.015 |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and Schoo Gender | 1900 KOR -0.043 (0.950) oles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.011 (0.150) -0.566* (0.277) ol Controls -0.108 (0.142) | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 (0.089) -0.006 (0.101) | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 (0.182) 0.015 (0.110) | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 (0.154) 0.032 (0.097) | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 (0.123) -0.072 (0.105) | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) -0.099 (0.137) -0.110 (0.215) 0.015 (0.119) |
| N Intercept Independent Varial Devpeople_FOR Hire_FOR ManInstruct_FOR SetDirection_FOR SetSalary_FOR Principal and Schoo Gender Age | 1900 KOR -0.043 (0.950) oles -0.035 (0.063) 0.205 (0.119) 0.075 (0.111) -0.0311 (0.150) -0.566* (0.277) Ol Controls -0.108 (0.142) -0.046 | 2308 LVA -0.735** (0.277) 0.018 (0.129) -0.096 (0.075) 0.056 (0.068) 0.163* (0.082) -0.083 (0.089) -0.006 (0.101) 0.010 | 2392 MEX -0.001 (0.302) -0.176* (0.073) 0.035 (0.144) 0.121 (0.082) -0.061 (0.114) 0.093 (0.182) 0.015 (0.110) 0.006 | 2641 MYS 0.685 (0.811) 0.017 (0.075) -0.198 (0.245) 0.109 (0.069) -0.002 (0.074) 0.058 (0.154) 0.032 (0.097) -0.011 | 882 NLD -0.397 (0.597) -0.211* (0.106) -0.067 (0.081) 0.031 (0.085) 0.126 (0.108) -0.076 (0.123) -0.072 (0.105) 0.002 | 3153 NOR 0.098 (0.288) 0.280** (0.094) 0.295* (0.144) -0.195* (0.080) -0.099 (0.137) -0.110 (0.215) 0.015 (0.119) -0.007 |

| Table 38 (cont'd) | | | | | |
|---|--|--|--|--|--|
| Education 0.19 | 1 0.000 | -0.171 | 0.000 | 0.184 | 0.000 |
| (0.20 | .) (0) | (0.132) | (.) | (0.446) | (.) |
| Experience 0.04 | 8 -0.004 | -0.001 | 0.003 | 0.003 | -0.007 |
| (0.03 | (0.005) (0.005) | (0.006) (0.006) | (0.009) | (0.009) | (0.010) |
| Employstatus 0.00 | 0 0.382* | [*] 0.148 | 0.000 | 0.153 | -0.030 |
| (.) | (0.185 | (0.266) | (.) | (0.157) | (0.258) |
| Location 0.00 | 6 -0.040 | -0.172 | -0.059 | -0.114 | 0.345** |
| (0.18 | 36) (0.097 | (0.123) | (0.096) | (0.199) | (0.124) |
| Managetype 0.05 | 5 -0.331 | 0.130 | 0.000 | 0.056 | -0.080 |
| (0.16 | 64) (0.244 |) (0.306) | (.) | (0.154) | (0.200) |
| Publicfund 0.19 | 4 0.000 | -0.007 | -0.025 | 0.000 | 0.031 |
| (0.23 | (0.127 | ') (0.099) | (0.134) | (.) | (0.195) |
| Size 0.00 | 0 -0.000 | 0.000 | -0.000 | -0.000 | 0.000 |
| (0.00 |)0) (0.000 |) (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant 0.18 | 6 0.057 | -0.009 | -0.045 | 0.072 | -0.177* |
| (0.14) | 40) (0.060 |) (0.078) | (0.032) | (0.078) | (0.090) |
| LowSES -0.10 | -0.083 | -0.024 | -0.054 | -0.063 | 0.111 |
| (0.08 | (0.056 | 6) (0.047) | (0.039) | (0.066) | (0.077) |
| Teacher Controls | | | | | |
| Gender -0.40 | 0.172 | -0.045 | 0.335** | * 0.016 | 0.123 |
| (0.13 | (0.131) (0.131 |) (0.089) | (0.095) | (0.101) | (0.090) |
| Age -0.03 | 31* -0.007 | 0.002 | 0.007 | -0.008 | -0.003 |
| (0.0) | (0.007 | ') (0.007) | (0.010) | (0.007) | (0.009) |
| Employstatus -0.12 | -0.071 | 0.178* | 0.030 | 0.495** | * 0.165 |
| (0.53 | (0.127 | ') (0.088) | (0.221) | (0.148) | (0.105) |
| Experience 0.04 | 1*** 0.018 ³ | * 0.009 | 0.005 | 0.011 | 0.010 |
| (0.01 | (0.007 | (0.007) | (0.009) | (0.008) | (0.006) |
| Tenure -0.05 | 5 3 0.111 | -0.122 | -0.151 | 0.089 | 0.170 |
| (0.13 | (0.127) | (0.123) | (1.091) | (0.162) | (0.249) |
| Education 0.66 | 5 0.262 | 0.070 | 0.099 | -0.076 | -0.380* |
| (0.34 | (0.197 | (0.088) | (0.108) | (0.137) | (0.178) |
| Training 0.49 | / | | | () | (*****) |
| | 7 0.166 | 0.064 | 0.161 | 0.305 | 0.259 |
| (0.20 | 7 0.166 59) (0.141 | 0.064) (0.093) | 0.161 (0.127) | 0.305 (0.172) | 0.259 (0.186) |
| (0.20 Variance Component | 7 0.166 59) (0.141 | 0.064) (0.093) | 0.161 (0.127) | 0.305 (0.172) | 0.259 (0.186) |
| (0.20Variance ComponentBetween0.01 | 7 0.166 59) (0.141 9*** 0.011 | 0.064) (0.093) *** 0.019** | 0.161 (0.127) ** 0.021** | 0.305 (0.172) * 0.013** | 0.259 (0.186) * 0.008*** |
| (0.20 Variance Component Between 0.01 (0.00 | 7 0.166 59) (0.141 9*** 0.011 ² 08) (0.005 | 0.064 (0.093) *** 0.019** (0.006) | 0.161 (0.127) ** 0.021** (0.007) | 0.305 (0.172) * 0.013** (0.006) | 0.259 (0.186) * 0.008*** (0.004) |
| (0.20 Variance Component Between 0.01 (0.00 Within 0.49 | 7 0.166 59) (0.141 9*** 0.011* 08) (0.005 0*** 0.289* | 0.064) (0.093) *** 0.019** (0.006) *** 0.429** | 0.161 (0.127) ** 0.021** (0.007) ** 0.484** | 0.305 (0.172) * 0.013** (0.006) * 0.313** | 0.259 (0.186) * 0.008*** (0.004) * 0.269*** |
| (0.20 Variance Component Between 0.01 (0.00 Within 0.49 _(0.00 | 7 0.166 59) (0.141 9*** 0.011* 98) (0.005 0*** 0.289* 20) (0.013 | 0.064) (0.093) *** 0.019** (0.006) *** 0.429** (0.017) | 0.161 (0.127) ** 0.021** (0.007) ** 0.484** (0.016) | 0.305 (0.172) * 0.013** (0.006) * 0.313** (0.023) | 0.259 (0.186) * 0.008*** (0.004) * 0.269*** (0.015) |

| Table 38 (cont'd) | | | | | | |
|-------------------------|-------------|---------------|---------|---------------|---------|----------|
| | POL | PRT | ROU | SGP | SRB | SVK |
| Intercept | -0.389 | 0.355 | 0.022 | - 1.688*** | 0.645 | -0.192 |
| | (0.514) | (0.235) | (0.265) | (0.454) | (0.440) | (0.569) |
| Independent Varia | oles | | | | | |
| Devpeople_FOR | 0.018 | 0.099** | -0.012 | 0.006 | 0.015 | -0.014 |
| | (0.058) | (0.038) | (0.063) | (0.096) | (0.079) | (0.064) |
| Hire_FOR | -0.039 | 0.010 | -0.076 | -0.053 | 0.040 | 0.040 |
| | (0.172) | (0.059) | (0.081) | (0.068) | (0.087) | (0.067) |
| ManInstruct_FOR | 0.142* | -0.135** | -0.003 | -0.048 | 0.058 | -0.061 |
| | (0.070) | (0.052) | (0.056) | (0.078) | (0.077) | (0.059) |
| SetDirection_FOR | -0.062 | 0.118* | -0.072 | -0.098 | -0.062 | -0.008 |
| | (0.102) | (0.058) | (0.100) | (0.117) | (0.084) | (0.090) |
| SetSalary_FOR | -0.129 | 0.054 | -0.168 | 0.023 | -0.066 | 0.004 |
| | (0.088) | (0.076) | (0.159) | (0.122) | (0.109) | (0.097) |
| Principal and Schoo | ol Controls | | | | | |
| Gender | 0.042 | 0.006 | 0.025 | 0.038 | -0.118 | 0.174* |
| | (0.080) | (0.060) | (0.082) | (0.088) | (0.076) | (0.070) |
| Age | -0.007 | 0.005 | -0.006 | 0.019 | -0.011 | 0.004 |
| | (0.007) | (0.005) | (0.006) | (0.013) | (0.006) | (0.007) |
| Education | 0.758*** | 0.008 | -0.061 | 0.040 | -0.623 | -0.341 |
| | (0.159) | (0.053) | (0.157) | (0.278) | (0.345) | (0.241) |
| Experience | 0.013* | -0.004 | -0.007 | -0.022 | 0.011 | 0.008 |
| | (0.007) | (0.004) | (0.008) | (0.016) | (0.008) | (0.006) |
| Employstatus | 0.484 | 0.229** | 0.159 | 0.000 | 0.000 | 0.011 |
| | (0.314) | (0.080) | (0.081) | (.) | (.) | (0.240) |
| Location | 0.098 | 0.091 | 0.165 | 0.000 | 0.020 | -0.099 |
| | (0.089) | (0.055) | (0.089) | (.) | (0.092) | (0.075) |
| Managetype | -0.366* | - 0.470*** | 0.000 | 0.000 | 0.000 | 0.081 |
| | (0.178) | (0.096) | (.) | (.) | (.) | (0.147) |
| Publicfund | -0.090 | -0.094 | -0.002 | 0.591* | 0.090 | 0.047 |
| | (0.159) | (0.094) | (0.101) | (0.254) | (0.103) | (0.117) |
| Size | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | 0.097 | 0.061 | -0.087 | -0.022 | -0.066 | -0.031 |
| | (0.145) | (0.062) | (0.047) | (0.044) | (0.067) | (0.043) |
| LowSES | -0.125* | 0.005 | 0.028 | 0.152* | 0.082 | -0.090 |
| | (0.063) | (0.035) | (0.036) | (0.059) | (0.055) | (0.056) |
| Teacher Controls | | | | | | |
| Gender | 0.323*** | 0.163* | 0.231** | 0.324** | 0.123 | 0.360*** |
| | (0.095) | (0.069) | (0.072) | (0.101) | (0.072) | (0.096) |

| Table 38 (cont'd) | | | | | | |
|---------------------|-------------|----------|----------|----------|----------|----------|
| Age | 0.007 | 0.001 | 0.002 | 0.027** | 0.000 | 0.003 |
| | (0.010) | (0.008) | (0.006) | (0.010) | (0.007) | (0.008) |
| Employstatus | 0.097 | 0.034 | 0.037 | 0.565* | 0.038 | 0.118 |
| | (0.106) | (0.125) | (0.109) | (0.221) | (0.117) | (0.132) |
| Experience | 0.008 | 0.001 | 0.010 | 0.026* | 0.016* | 0.016* |
| | (0.010) | (0.009) | (0.005) | (0.011) | (0.007) | (0.008) |
| Tenure | 0.185 | 0.066 | 0.084 | 0.220 | -0.005 | 0.076 |
| | (0.163) | (0.085) | (0.074) | (0.129) | (0.117) | (0.095) |
| Education | -0.299 | -0.073 | -0.116 | 0.161 | -0.069 | -0.147 |
| | (0.359) | (0.078) | (0.075) | (0.139) | (0.101) | (0.188) |
| Training | 0.652 | 0.050 | 0.298 | 0.549 | 0.051 | 0.120 |
| | (0.639) | (0.071) | (0.181) | (0.502) | (0.099) | (0.129) |
| Variance Component | nt | | | | | |
| Between | 0.016*** | 0.000 | 0.028*** | 0.004*** | 0.011*** | 0.010*** |
| | (0.005) | (0.003) | (0.008) | (0.003) | (0.005) | (0.003) |
| Within | 0.350*** | 0.299*** | 0.329*** | 0.442*** | 0.389*** | 0.346*** |
| | (0.012) | (0.010) | (0.013) | (0.013) | (0.015) | (0.012) |
| Ν | 3168 | 2636 | 3067 | 2646 | 2442 | 3055 |
| | SWE | USA | | | | |
| Intercept | -0.158 | -1.259** | - | | | |
| | (0.237) | (0.448) | | | | |
| Independent Varia | oles | | - | | | |
| Devpeople_FOR | 0.229*** | 0.157 | - | | | |
| | (0.053) | (0.098) | | | | |
| Hire_FOR | -0.087 | 0.060 | | | | |
| | (0.163) | (0.113) | | | | |
| ManInstruct_FOR | -0.127 | 0.021 | | | | |
| | (0.069) | (0.072) | | | | |
| SetDirection_FOR | 0.163 | 0.118 | | | | |
| | (0.131) | (0.129) | | | | |
| SetSalary_FOR | -0.099 | -0.300 | | | | |
| | (0.152) | (0.348) | _ | | | |
| Principal and Schoo | ol Controls | | | | | |
| Gender | 0.028 | -0.016 | | | | |
| | (0.077) | (0.131) | | | | |
| Age | 0.005 | -0.011 | | | | |
| | (0.006) | (0.009) | | | | |
| Education | 0.087 | 0.089 | | | | |
| | (0.115) | (0.140) | | | | |
| Experience | -0.004 | -0.003 | | | | |
| | (0.010) | (0.016) | | | | |

| Employstatus 0.000 0.062 (.) (0.319) Location 0.139 0.215 (0.098) (0.159) Managetype -0.231 0.287 (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) (0.000) Immigrant -0.091 0.010 (0.068) (0.058) (0.058) Feacher Controls (0.068) (0.058) Feacher Controls (0.006) (0.007) Age 0.006 0.001 (0.078) (0.119) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Enure 0.401*** 0.283* (0.122) (0.140) (0.140) |
|--|
| (.) (0.319) Location 0.139 0.215 (0.098) (0.159) Managetype -0.231 0.287 (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| Location 0.139 0.215 (0.098) (0.159) Managetype -0.231 0.287 (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Teacher Controls Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.401*** 0.283* (0.122) (0.140) |
| (0.098) (0.159) Managetype -0.231 0.287 (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| Managetype -0.231 0.287 (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) 0.053 LowSES 0.053 0.048 (0.068) (0.058) 0.058) Teacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.357) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| Publicfund (0.135) (0.459) Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.357) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| Publicfund 0.000 -0.248 (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| (.) (0.251) Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Teacher Controls Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| Size 0.000 -0.000 (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| (0.000) (0.000) Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Teacher Controls (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) (0.009) Experience 0.401*** 0.283* (0.122) (0.140) |
| Immigrant -0.091 0.010 (0.061) (0.075) LowSES 0.053 0.048 (0.068) (0.058) Feacher Controls Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| (0.061) (0.075) 0.053 0.048 (0.068) (0.058) Feacher Controls (0.078) Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure (0.122) (0.140) |
| LowSES 0.053 (0.068) 0.048 (0.058) Feacher Controls (0.058) Gender 0.116 (0.078) 0.151 (0.119) Age 0.006 (0.005) 0.001 (0.007) Employstatus 0.182* (0.079) 0.053 (0.357) Experience 0.017*** (0.005) 0.011 (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| (0.068) (0.058) Feacher Controls (0.116 0.151 Gender 0.0078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure (0.122) (0.140) |
| Teacher Controls Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| Gender 0.116 0.151 (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| (0.078) (0.119) Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Tenure 0.401*** 0.283* (0.122) (0.140) |
| Age 0.006 0.001 (0.005) (0.007) Employstatus 0.182* 0.053 (0.079) (0.357) Experience 0.017*** 0.011 (0.005) (0.009) Fenure 0.401*** 0.283* (0.122) (0.140) |
| Employstatus(0.005)(0.007)0.182*0.053(0.079)(0.357)Experience0.017***0.011(0.005)(0.009)Tenure0.401***0.283*(0.122)(0.140) |
| Employstatus0.182*0.053(0.079)(0.357)Experience0.017***0.011(0.005)(0.009)Tenure0.401***0.283*(0.122)(0.140) |
| (0.079)(0.357)Experience0.017***0.011(0.005)(0.009)Tenure0.401***0.283*(0.122)(0.140) |
| Experience0.017***0.011(0.005)(0.009) Tenure 0.401***0.283*(0.122)(0.140) |
| (0.005)(0.009) Tenure 0.401***0.283*(0.122)(0.140) |
| Tenure 0.401*** 0.283* (0.122) (0.140) |
| (0.122) (0.140) |
| |
| Education 0.040 0.118 |
| (0.078) (0.332) |
| Fraining -0.116 0.834*** |
| (0.152) (0.232) |
| Variance Component |
| Between 0.010*** 0.006*** |
| (0.004) (0.006) |
| Within 0.324*** 0.437*** |
| (0.012) (0.018) |
| N 2680 1526 |

Standard errors in parentheses * p<0.05, ** p<0.01, *** p<0.001

APPENDIX G: Informal Leaders' Impact on Teaching Quality across 32 Countries

| Intercept 0.034*** 0.006*** 0.000 0.018*** 0.022*** 0.011*** Independent Variables (0.024) (0.005) (0.003) (0.007) (0.005) (0.006) Independent Variables (0.057) (0.084) (0.067) (0.068) (0.040) (0.105) Hire_INF 0.315 -0.170 0.049 -0.081 0.266* 0.082 (0.210) (0.146) (0.115) (0.082) (0.123) (0.113) ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 (0.068) (0.082) (0.060) (0.084) (0.045) (0.074) SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.100 (0.222) (.) (.) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 -0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.017) (0.344) Principal and Sebol <th></th> <th>AAD</th> <th>AUS</th> <th>BFL</th> <th>BGR</th> <th>BRA</th> <th>CAB</th> | | AAD | AUS | BFL | BGR | BRA | CAB |
|--|--------------------|----------|----------|---------|---------------|----------|----------|
| (0.024) (0.005) (0.003) (0.007) (0.005) (0.006) Independent Variables 0.001 | Intercept | 0.034*** | 0.006*** | 0.000 | 0.018*** | 0.022*** | 0.011*** |
| Independent Variables Devpeople_INF 0.078 -0.012 -0.118 0.070 0.094* 0.016 (0.057) (0.084) (0.067) (0.068) (0.040) (0.105) Hire_INF 0.315 -0.170 0.049 -0.081 0.266* 0.082 (0.210) (0.146) (0.115) (0.082) (0.123) (0.113) ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 (0.068) (0.082) (0.060) (0.084) (0.045) (0.074) SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* (0.208) (0.137) (0.120) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 0.000 -0.001 0.152 0.110 (0.222) () () (0.095) (0.177) (0.344) Principal and School | | (0.024) | (0.005) | (0.003) | (0.007) | (0.005) | (0.006) |
| Devpeople_INF 0.078 -0.012 -0.118 0.070 0.094* 0.016 (0.057) (0.084) (0.067) (0.068) (0.040) (0.105) Hire_INF 0.315 -0.170 0.049 -0.081 0.266* 0.082 (0.210) (0.146) (0.115) (0.082) (0.123) (0.113) ManInstruct_INF -0.02 -0.080 -0.049 0.042 -0.063 0.091 (0.068) (0.082) (0.045) (0.074) (0.074) (0.017) SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* (0.208) (0.137) (0.120) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 -0.005 (0.076) (0.177) (0.344) Principal and School Controls 0.006 -0.015 0.003 -0.118 -0.009* -0.005 Gender 0.061 0.139 0.114 0.006 -0.015 0.009) | Independent Varia | bles | | | | | |
| (0.057) (0.084) (0.067) (0.068) (0.040) (0.105) Hire_INF 0.315 -0.170 0.049 -0.081 0.266* 0.082 ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 O(.222) (.) (.) (0.095) (0.177) (0.344) Principal and Schoot Controls 0.016 0.139 0.114 0.006 -0.063 0.139 Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Guodo -0.015 0.003 -0.018 -0.009* -0.005 Gender 0.006 -0.015 0.003 -0.018 -0.009* -0.005 Guodo 0.010 0.6055 (0.108) 0.0005 (0.010) Guodo <th>Devpeople_INF</th> <th>0.078</th> <th>-0.012</th> <th>-0.118</th> <th>0.070</th> <th>0.094*</th> <th>0.016</th> | Devpeople_INF | 0.078 | -0.012 | -0.118 | 0.070 | 0.094* | 0.016 |
| Hire_INF 0.315 -0.170 0.049 -0.081 0.266* 0.082 ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* 60.208 (0.137) (0.120) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and Schoot - (.) (0.095) (0.177) (0.344) Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Gonder 0.006 (0.015) 0.003 -0.018 -0.009* -0.005 Gonder 0.006 (0.010) (0.005) (0.009) (0.005) (0.010) Age 0.006 (0.011) (0.008) (0.028) (0.285) Gonder 0.011 0.0065 | | (0.057) | (0.084) | (0.067) | (0.068) | (0.040) | (0.105) |
| (0.210) (0.146) (0.115) (0.082) (0.123) (0.113) ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* SetSalary_INF 0.028 (0.137) (0.120) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and Schoot - (0.096) (0.136) (0.076) (0.115) (0.084) (0.110) Age 0.061 0.139 0.114 0.006 -0.005 (0.010) Education 0.001 0.612** -0.074 - - - 0.070 (0.010) 0.005 (0.007) (0.010) 0.002** 0.010 0.025* 0.010 0.025* 0.010 0.025* 0.010 0.025* 0.010) | Hire_INF | 0.315 | -0.170 | 0.049 | -0.081 | 0.266* | 0.082 |
| ManInstruct_INF -0.102 -0.080 -0.049 0.042 -0.063 0.091 SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 Controls (.) (.) (0.095) (0.177) (0.344) Principal and Schout (.) (.) (0.095) (0.177) (0.344) Controls 0.006 -0.015 0.003 -0.018 -0.009* -0.005 Mage 0.006 -0.015 0.003 -0.018 -0.009* -0.005 Mage 0.001 0.612** -0.074 - | | (0.210) | (0.146) | (0.115) | (0.082) | (0.123) | (0.113) |
| (0.068) (0.082) (0.060) (0.084) (0.045) (0.074) SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* (0.208) (0.137) (0.120) (0.095) (0.074) (0.119) SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and School | ManInstruct_INF | -0.102 | -0.080 | -0.049 | 0.042 | -0.063 | 0.091 |
| SetDirection_INF 0.023 0.062 -0.090 -0.250** -0.160* -0.300* SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.074) (0.119) Principal and School (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and School (0.096) (0.136) (0.076) (0.115) (0.084) (0.110) Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.096) (0.010) (0.005) (0.009) (0.005) (0.010) Age 0.001 0.612** -0.074 - 0.444*** 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.011 -0.010 0.022** 0.010 0.005 (0.020) (0.231) (0.303) (.) (0.121) (0.27) | | (0.068) | (0.082) | (0.060) | (0.084) | (0.045) | (0.074) |
| SetSalary_INF (0.208) (0.137) (0.120) (0.095) (0.074) (0.119) Principal and School (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and School (0.096) (0.139) 0.114 0.006 -0.063 0.139 Gender 0.061 0.139 (0.076) (0.115) (0.084) (0.110) Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) Education 0.001 0.612** -0.074 - 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.020) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467**** <tr< th=""><th>SetDirection_INF</th><th>0.023</th><th>0.062</th><th>-0.090</th><th>-0.250**</th><th>-0.160*</th><th>-0.300*</th></tr<> | SetDirection_INF | 0.023 | 0.062 | -0.090 | -0.250** | -0.160* | -0.300* |
| SetSalary_INF -0.361 0.000 0.000 -0.031 0.152 0.110 (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and School Controls | | (0.208) | (0.137) | (0.120) | (0.095) | (0.074) | (0.119) |
| (0.222) (.) (.) (0.095) (0.177) (0.344) Principal and School Controls Francipal and School (0.096) 0.139 0.114 0.006 -0.063 0.139 Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) Education 0.001 0.612** -0.074 - - 0.158* 0.070 Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.022) (0.231) (0.303) (.) (0.121) (0.207) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** | SetSalary_INF | -0.361 | 0.000 | 0.000 | -0.031 | 0.152 | 0.110 |
| Principal and School Controls Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) Education 0.001 0.612** -0.074 - 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.005) (0.010) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.407*** (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.071) (0.181) (0.290) (0.288) | | (0.222) | (.) | (.) | (0.095) | (0.177) | (0.344) |
| Controis Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Age 0.096 (0.136) (0.076) (0.115) (0.084) (0.110) Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) Education 0.001 0.612** -0.074 - 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.005) (0.010) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (| Principal and Scho | ol | | | | | |
| Gender 0.061 0.139 0.114 0.006 -0.063 0.139 Age (0.096) (0.136) (0.076) (0.115) (0.084) (0.110) Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) Education 0.001 0.612** -0.074 - 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.010) 0.005 Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.162) (0.169) | Controls | 0.061 | 0.120 | 0.114 | 0.000 | 0.072 | 0.120 |
| Age (0.096) (0.136) (0.076) (0.115) (0.084) (0.110) Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 Education 0.001 0.612** -0.074 - 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.010) 0.005 (0.010) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.071) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - - 0.158 0.458 | Genuer | 0.001 | 0.139 | 0.114 | 0.006 | -0.063 | 0.139 |
| Age 0.006 -0.015 0.003 -0.018 -0.009* -0.005 Education (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) 0.001 0.612** -0.074 - 0.444*** 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.010) 0.005 (0.010) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - 0.458 (0.162) | | (0.096) | (0.136) | (0.076) | (0.115) | (0.084) | (0.110) |
| Education (0.006) (0.010) (0.005) (0.009) (0.005) (0.010) 0.001 0.612^{**} -0.074 -0.444^{***} 0.158^{*} 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022^{**} 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.005) (0.010) Employstatus 0.783^{***} 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) $(.)$ (0.121) (0.207) Location -0.146 0.083 0.041 0.258^{*} -0.219^{*} 0.467^{***} (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 -0.158 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 -0.493^{*} 0.000 0.000 -0.325 0.213 (0.112) (0.204) $(.)$ $(.)$ $(.)$ (0.270) (0.236) Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) | Age | 0.006 | -0.015 | 0.003 | -0.018 | -0.009* | -0.005 |
| Education 0.001 0.612** -0.074 -0.444*** 0.158* 0.070 (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 -0.493* 0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0 | | (0.006) | (0.010) | (0.005) | (0.009) | (0.005) | (0.010) |
| Experience (0.126) (0.213) (0.065) (0.108) (0.080) (0.285) Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype -0.152 -0.088 0.075 - | Education | 0.001 | 0.612** | -0.074 | - 0.444*** | 0.158* | 0.070 |
| Experience 0.004 0.001 -0.010 0.022** 0.010 0.005 (0.007) (0.011) (0.008) (0.007) (0.005) (0.010) Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - 0.158 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 -0.493* 0.000 -0.000 -0.000 0.0236) Size -0.000 0.000 (0.000) -0.000 -0.000 -0.000 Monol (0.000) (0.000) (0.000) -0.000 -0.000 -0.000 Managetype | | (0.126) | (0.213) | (0.065) | (0.108) | (0.080) | (0.285) |
| Employstatus (0.007) (0.011) (0.008) (0.007) (0.005) (0.010) 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - 0.158 0.458 Publicfund 0.070 -0.493* 0.000 0.000 -0.219* 0.488) Size -0.000 0.0711 (0.251) (0.290) (0.288) Size -0.000 0.000 -0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) -0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) -0.000 -0.000 -0.000 -0.000 | Experience | 0.004 | 0.001 | -0.010 | 0.022** | 0.010 | 0.005 |
| Employstatus 0.783*** 0.114 0.046 0.000 0.011 0.400 (0.202) (0.231) (0.303) (.) (0.121) (0.207) Location -0.146 0.083 0.041 0.258* -0.219* 0.467*** (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 - - 0.158 0.458 Publicfund 0.070 -0.493* 0.000 0.000 -0.325 0.213 Size -0.000 0.000 (0.000) (0.000) (0.000) - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - 0.000 - - | | (0.007) | (0.011) | (0.008) | (0.007) | (0.005) | (0.010) |
| Location (0.202) (0.231) (0.303) $(.)$ (0.121) (0.207) Location -0.146 0.083 0.041 $0.258*$ $-0.219*$ $0.467***$ Managetype (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 $ -0.158$ 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 $-0.493*$ 0.000 0.000 -0.325 0.213 Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 -0.000 Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 | Employstatus | 0.783*** | 0.114 | 0.046 | 0.000 | 0.011 | 0.400 |
| Location -0.146 0.083 0.041 $0.258*$ $-0.219*$ $0.467***$ Managetype (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) Managetype 0.122 -0.088 0.075 $-$ $0.834***$ -0.158 0.458 Publicfund (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 $-0.493*$ 0.000 0.000 -0.325 0.213 Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 | | (0.202) | (0.231) | (0.303) | (.) | (0.121) | (0.207) |
| Managetype (0.085) (0.200) (0.077) (0.108) (0.090) (0.124) 0.122 -0.088 0.075 -0.158 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 $-0.493*$ 0.000 0.000 -0.325 0.213 (0.112) (0.204) $(.)$ $(.)$ $(.)$ (0.270) (0.236) Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.050 | Location | -0.146 | 0.083 | 0.041 | 0.258* | -0.219* | 0.467*** |
| Managetype 0.122 -0.088 0.075 -0.158 0.458 (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) Publicfund 0.070 $-0.493*$ 0.000 0.000 -0.325 0.213 (0.112) (0.204) $(.)$ $(.)$ $(.)$ (0.270) (0.236) Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.050 | | (0.085) | (0.200) | (0.077) | (0.108) | (0.090) | (0.124) |
| Publicfund (0.162) (0.169) (0.071) (0.251) (0.290) (0.288) 0.070 $-0.493*$ 0.000 0.000 -0.325 0.213 (0.112) (0.204) $(.)$ $(.)$ $(.)$ (0.270) (0.236) Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 | Managetype | 0.122 | -0.088 | 0.075 | - 0.834*** | -0.158 | 0.458 |
| Publicfund 0.070 -0.493* 0.000 0.000 -0.325 0.213 (0.112) (0.204) (.) (.) (0.270) (0.236) Size -0.000 0.000 -0.000 -0.000 -0.000 (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 | | (0.162) | (0.169) | (0.071) | (0.251) | (0.290) | (0.288) |
| Size (0.112) (0.204) $(.)$ $(.)$ $(.)$ (0.270) (0.236) Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 -0.000 Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 (0.020) (0.087) (0.045) (0.092) (0.050) | Publicfund | 0.070 | -0.493* | 0.000 | 0.000 | -0.325 | 0.213 |
| Size -0.000 0.000 0.000 -0.000 -0.000 -0.000 (0.000)(0.000)(0.000)(0.000)(0.000)(0.000)(0.000)Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 (0.020)(0.087)(0.045)(0.092)(0.050) | | (0.112) | (0.204) | (.) | (.) | (0.270) | (0.236) |
| Immigrant (0.000) (0.000) (0.000) (0.000) (0.000) (0.000) (0.020) (0.031) 0.108 -0.016 0.026 -0.051 0.056 (0.020) (0.087) (0.045) (0.092) (0.050) | Size | -0.000 | 0.000 | 0.000 | -0.000 | -0.000 | -0.000 |
| Immigrant -0.031 0.108 -0.016 0.026 -0.051 0.056 (0.020)(0.087)(0.045)(0.092)(0.050) | | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| (0.020) (0.087) (0.045) (0.002) (0.050) | Immigrant | -0.031 | 0.108 | -0.016 | 0.026 | -0.051 | 0.056 |
| (0.029) (0.067) (0.043) (0.043) (0.092) (0.039) | 0 | (0.029) | (0.087) | (0.045) | (0.045) | (0.092) | (0.059) |

Table 39: Informal Leaders' Impact on Teaching Quality across 32 Countries

| Table 39 (cont'd) | | | | | | |
|-------------------------|------------|-------------------|----------|-------------------|----------|----------|
| LowSES | -0.034 | 0.049 | -0.048 | -0.114* | 0.022 | -0.109 |
| | (0.041) | (0.073) | (0.048) | (0.057) | (0.037) | (0.063) |
| Teacher Controls | | | | | | |
| Gender | 0.028 | 0.464*** | 0.230** | -0.127 | 0.203 | 0.221* |
| | (0.100) | (0.120) | (0.082) | (0.096) | (0.108) | (0.102) |
| Age | 0.000 | -0.014 | 0.005 | -0.003 | 0.014* | 0.020* |
| | (0.010) | (0.010) | (0.005) | (0.007) | (0.006) | (0.008) |
| Employstatus | 0.617 | 0.222 | 0.202* | 0.250 | 0.117 | 0.443* |
| | (0.422) | (0.150) | (0.095) | (0.203) | (0.083) | (0.192) |
| Experience | 0.025* | 0.038** | 0.006 | -0.008 | 0.003 | 0.012 |
| | (0.011) | (0.012) | (0.006) | (0.006) | (0.007) | (0.011) |
| Tenure | 0.055 | 0.331 | 0.395*** | 0.068 | -0.233** | 0.078 |
| | (0.089) | (0.226) | (0.106) | (0.143) | (0.086) | (0.133) |
| Education | 0.041 | 0.091 | -0.061 | -0.031 | 0.065 | -0.073 |
| | (0.120) | (0.522) | (0.103) | (0.150) | (0.100) | (0.289) |
| Training | -0.011 | -0.480 | 0.224 | 0.502 | 0.238* | -0.255 |
| | (0.129) | (0.330) | (0.293) | (0.380) | (0.097) | (0.491) |
| Variance Compone | ent | | | | | |
| Between | 0.025** | 0.043*** | 0.000 | 0.069*** | 0.064*** | 0.004 |
| | (0.029) | (0.040) | (0.000) | (0.025) | (0.025) | (0.025) |
| Within | 0.497*** | 0.377*** | 0.331*** | 0.381*** | 0.354*** | 0.392*** |
| | (0.020) | (0.023) | (0.010) | (0.016) | (0.012) | (0.017) |
| Ν | 1558 | 1491 | 2257 | 1909 | 5459 | 1331 |
| | CHL | CZE | DNK | ENG | ESP | EST |
| Intercept | 0.034*** | 0.015*** | 0.012*** | 0.006*** | 0.007*** | 0.006*** |
| | (0.015) | (0.005) | (0.005) | (0.004) | (0.004) | (0.004) |
| Independent Varia | bles | | | | | |
| Devpeople_INF | -0.234 | -0.012 | -0.176* | -0.088 | -0.056 | -0.048 |
| | (0.137) | (0.073) | (0.072) | (0.070) | (0.091) | (0.065) |
| Hire_INF | 0.929** | -0.090 | -0.015 | -0.161 | 0.170 | 0.043 |
| | (0.325) | (0.128) | (0.053) | (0.108) | (0.108) | (0.060) |
| ManInstruct_INF | -0.034 | 0.006 | -0.008 | 0.131 | -0.149* | 0.116** |
| | (0.107) | (0.049) | (0.067) | (0.069) | (0.066) | (0.044) |
| SetDirection_INF | -0.672* | 0.131 | 0.026 | 0.516*** | -0.070 | 0.036 |
| | (0.264) | (0.074) | (0.061) | (0.155) | (0.108) | (0.089) |
| SetSalary_INF | 0.000 | 0.000 | -0.122 | -0.079 | 0.000 | 0.018 |
| | 4 N | $\langle \rangle$ | (0, 001) | $(0 \ 1 \ 1 \ 1)$ | () | (0, 008) |
| | (.) | (.) | (0.091) | (0.111) | (.) | (0.098) |
| Principal and Scho | (.) ool | (.) | (0.091) | (0.111) | (.) | (0.098) |

| Table 39 (cont'd) | | | | | | |
|-------------------------|---------|----------|---------------|---------------|----------|----------|
| Gender | 0.273 | 0.066 | -0.009 | 0.280** | 0.143 | 0.048 |
| | (0.166) | (0.080) | (0.107) | (0.086) | (0.074) | (0.070) |
| Age | -0.005 | -0.011 | 0.007 | -0.010 | -0.008 | 0.000 |
| | (0.012) | (0.006) | (0.007) | (0.010) | (0.006) | (0.005) |
| Education | -0.162 | -0.016 | - 0.676*** | -0.120 | 0.031 | 0.212 |
| | (0.225) | (0.098) | (0.104) | (0.122) | (0.117) | (0.154) |
| Experience | 0.025* | 0.004 | 0.013 | 0.008 | -0.004 | 0.003 |
| | (0.011) | (0.006) | (0.008) | (0.009) | (0.008) | (0.004) |
| Employstatus | 0.397 | 0.193 | 0.000 | - 0.656*** | -0.241** | 0.057 |
| | (0.241) | (0.339) | (.) | (0.147) | (0.084) | (0.131) |
| Location | 0.393 | 0.034 | 0.140 | 0.004 | -0.198 | 0.063 |
| | (0.236) | (0.081) | (0.100) | (0.098) | (0.102) | (0.089) |
| Managetype | 0.712** | -0.263 | -0.273* | -0.217 | -0.252* | 0.080 |
| | (0.241) | (0.148) | (0.118) | (0.115) | (0.118) | (0.169) |
| Publicfund | -0.041 | -0.160 | 0.000 | 0.041 | 0.093 | 0.052 |
| | (0.227) | (0.089) | (.) | (0.149) | (0.109) | (0.108) |
| Size | 0.000 | -0.000 | -0.000 | 0.000 | 0.000** | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | 0.630** | 0.118 | 0.061 | 0.069 | -0.080 | 0.053 |
| | (0.206) | (0.080) | (0.054) | (0.041) | (0.045) | (0.036) |
| LowSES | 0.030 | -0.082 | -0.103 | -0.010 | 0.051 | 0.016 |
| | (0.064) | (0.055) | (0.070) | (0.056) | (0.047) | (0.043) |
| Teacher Controls | | | | | | |
| Gender | 0.382** | 0.063 | 0.538*** | 0.265** | 0.336*** | 0.300** |
| | (0.125) | (0.071) | (0.085) | (0.083) | (0.091) | (0.092) |
| Age | 0.011 | -0.008 | 0.003 | -0.006 | 0.005 | -0.017** |
| | (0.012) | (0.006) | (0.008) | (0.007) | (0.010) | (0.005) |
| Employstatus | 0.361* | 0.092 | 0.367* | 0.510*** | 0.247 | 0.113 |
| | (0.156) | (0.091) | (0.170) | (0.135) | (0.154) | (0.078) |
| Experience | -0.003 | 0.021*** | 0.017* | 0.021** | 0.001 | 0.012** |
| - | (0.013) | (0.006) | (0.007) | (0.008) | (0.010) | (0.005) |
| Tenure | -0.150 | 0.284** | 0.449** | 0.573** | -0.022 | 0.198* |
| | (0.179) | (0.101) | (0.156) | (0.182) | (0.126) | (0.093) |
| Education | 0.003 | -0.035 | 0.013 | -0.006 | -0.022 | -0.059 |
| | (0.143) | (0.068) | (0.142) | (0.224) | (0.098) | (0.063) |
| Training | 0.046 | 0.093 | 0.343 | 0.064 | 0.459* | 0.183 |
| | (0.231) | (0.077) | (0.243) | (0.190) | (0.221) | (0.131) |
| Variance Compone | ent | | | | | |

| Table 39 (cont'd) | | | | | | |
|--------------------------------|----------|----------|---------------|---------------|----------|----------|
| Between | 0.060* | 0.045*** | 0.000 | 0.029*** | 0.000*** | 0.018*** |
| | (0.066) | (0.025) | (0.000) | (0.025) | (0.000) | (0.020) |
| Within | 0.459*** | 0.321*** | 0.312*** | 0.388*** | 0.351*** | 0.354*** |
| | (0.031) | (0.010) | (0.017) | (0.025) | (0.015) | (0.014) |
| Ν | 701 | 3016 | 1117 | 2131 | 1976 | 2807 |
| | FIN | FRA | HRV | ISR | ITA | JPN |
| Intercept | 0.011*** | 0.012*** | 0.002*** | 0.021*** | 0.004*** | 0.016*** |
| | (0.004) | (0.004) | (0.003) | (0.006) | (0.005) | (0.003) |
| Independent Varia | bles | | | | | |
| Devpeople_INF | -0.327 | -0.028 | -0.004 | 0.216** | 0.047 | 0.031 |
| | (0.263) | (0.083) | (0.060) | (0.071) | (0.149) | (0.049) |
| Hire_INF | 0.140 | 0.379* | -0.021 | 0.080 | 0.000 | 0.179 |
| | (0.253) | (0.171) | (0.059) | (0.094) | (.) | (0.158) |
| ManInstruct_INF | -0.014 | -0.040 | 0.061 | -0.098 | 0.098 | -0.003 |
| | (0.080) | (0.064) | (0.059) | (0.069) | (0.110) | (0.052) |
| SetDirection_INF | -0.043 | 0.107 | -0.028 | -0.041 | -0.064 | 0.052 |
| | (0.121) | (0.095) | (0.096) | (0.112) | (0.095) | (0.106) |
| SetSalary_INF | -0.430** | 0.000 | 0.000 | - 0.512*** | 0.000 | 0.000 |
| | (0.143) | (.) | (.) | (0.112) | (.) | (.) |
| Principal and Scho Controls | ol | | | | | |
| Gender | 0.010 | -0.059 | 0.106 | 0.023 | -0.231* | -0.026 |
| | (0.113) | (0.085) | (0.073) | (0.125) | (0.114) | (0.123) |
| Age | 0.009 | 0.005 | 0.002 | -0.000 | 0.017 | 0.017 |
| | (0.008) | (0.006) | (0.005) | (0.008) | (0.009) | (0.016) |
| Education | 0.597*** | 0.010 | - 0.375*** | 0.161 | 0.164 | -0.021 |
| | (0.131) | (0.079) | (0.086) | (0.143) | (0.329) | (0.059) |
| Experience | -0.005 | 0.001 | -0.004 | -0.009 | -0.031** | -0.016 |
| | (0.009) | (0.007) | (0.006) | (0.009) | (0.011) | (0.015) |
| Employstatus | 0.472 | 0.000 | 0.000 | -0.350* | 0.000 | 0.000 |
| | (0.368) | (.) | (.) | (0.170) | (.) | (.) |
| Location | 0.069 | -0.020 | 0.107 | -0.058 | 0.286* | -0.193 |
| | (0.128) | (0.077) | (0.074) | (0.103) | (0.128) | (0.152) |
| Managetype | -0.086 | -0.135 | -0.408 | 0.094 | -0.028 | 0.176 |
| | (0.325) | (0.153) | (0.301) | (0.127) | (0.255) | (0.186) |
| Publicfund | -0.069 | -0.095 | 0.179 | -0.073 | 0.276** | -0.187 |
| | (0.111) | (0.155) | (0.122) | (0.113) | (0.093) | (0.253) |

| Table 39 (cont'd) | | | | | | |
|-------------------------|----------|----------|----------|----------|----------|---------------|
| Size | 0.001* | -0.000 | -0.000 | 0.000* | -0.001* | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | -0.019 | -0.017 | -0.048 | -0.092 | -0.183 | 0.051 |
| | (0.085) | (0.051) | (0.040) | (0.053) | (0.111) | (0.064) |
| LowSES | -0.190** | -0.040 | 0.006 | -0.025 | -0.052 | - 0.203*** |
| | (0.064) | (0.049) | (0.053) | (0.047) | (0.095) | (0.050) |
| Teacher Controls | | | | | | |
| Gender | 0.113 | 0.197** | 0.205* | 0.090 | 0.576*** | - 0.458*** |
| | (0.096) | (0.070) | (0.083) | (0.106) | (0.110) | (0.064) |
| Age | -0.006 | 0.011 | -0.009 | -0.020* | 0.011 | 0.024** |
| | (0.008) | (0.007) | (0.007) | (0.009) | (0.011) | (0.008) |
| Employstatus | -0.058 | 0.157 | -0.204* | 0.218* | 0.344 | 0.046 |
| | (0.169) | (0.095) | (0.102) | (0.100) | (0.198) | (0.189) |
| Experience | 0.018* | 0.010 | 0.036*** | 0.023* | 0.014 | -0.003 |
| | (0.009) | (0.007) | (0.007) | (0.010) | (0.010) | (0.008) |
| Tenure | -0.006 | -0.285 | 0.099 | 0.311 | -0.269 | 0.124 |
| | (0.100) | (0.194) | (0.131) | (0.181) | (0.240) | (0.086) |
| Education | 0.115 | 0.030 | 0.088 | 0.240 | -0.063 | -0.295* |
| | (0.166) | (0.088) | (0.110) | (0.214) | (0.092) | (0.145) |
| Training | -0.032 | 0.026 | 0.323* | -0.168 | 0.150 | 0.079 |
| | (0.187) | (0.102) | (0.149) | (0.181) | (0.147) | (0.111) |
| Variance Compone | ent | | | | | |
| Between | 0.041*** | 0.037*** | 0.008 | 0.069*** | 0.035** | 0.064*** |
| | (0.028) | (0.018) | (0.020) | (0.030) | (0.038) | (0.021) |
| Within | 0.397*** | 0.293*** | 0.308*** | 0.454*** | 0.324*** | 0.336*** |
| | (0.015) | (0.010) | (0.011) | (0.021) | (0.031) | (0.012) |
| Ν | 1897 | 2281 | 2381 | 2614 | 880 | 3139 |
| | KOR | LVA | MEX | MYS | NLD | NOR |
| Intercept | 0.023*** | 0.012*** | 0.019*** | 0.020*** | 0.012*** | 0.012*** |
| | (0.008) | (0.004) | (0.006) | (0.007) | (0.006) | (0.005) |
| Independent Varia | bles | | | | | |
| Devpeople_INF | -0.148 | 0.051 | -0.050 | 0.040 | 0.023 | 0.284 |
| | (0.098) | (0.097) | (0.077) | (0.061) | (0.096) | (0.227) |
| Hire_INF | 0.224 | 0.070 | 0.317 | -0.260 | 0.133 | 0.045 |
| | (0.241) | (0.074) | (0.168) | (0.308) | (0.085) | (0.131) |
| ManInstruct_INF | 0.089 | 0.075 | -0.069 | 0.091 | 0.038 | 0.064 |
| | (0.083) | (0.074) | (0.069) | (0.090) | (0.089) | (0.121) |

| Table 39 (cont'd) | | | | | | |
|-------------------------|----------|---------|---------|----------|----------|---------|
| SetDirection_INF | 0.025 | -0.136 | 0.076 | -0.041 | -0.092 | -0.394* |
| | (0.116) | (0.102) | (0.126) | (0.117) | (0.149) | (0.182) |
| SetSalary_INF | 0.452 | -0.031 | 0.000 | 0.702*** | 0.000 | 0.266 |
| | (0.268) | (0.080) | (.) | (0.185) | (.) | (0.146) |
| Principal and Scho | ol | | | | | |
| Controls | | | | | | |
| Gender | -0.092 | -0.011 | -0.018 | 0.041 | -0.023 | 0.069 |
| | (0.148) | (0.092) | (0.105) | (0.093) | (0.104) | (0.126) |
| Age | -0.022 | 0.009 | 0.004 | -0.013 | 0.003 | -0.009 |
| | (0.033) | (0.006) | (0.008) | (0.015) | (0.009) | (0.010) |
| Education | 0.108 | 0.000 | -0.100 | 0.000 | 0.241 | 0.000 |
| | (0.204) | (.) | (0.142) | (.) | (0.560) | (.) |
| Experience | 0.049 | -0.005 | -0.004 | 0.003 | 0.001 | -0.001 |
| | (0.030) | (0.005) | (0.007) | (0.008) | (0.010) | (0.011) |
| Employstatus | 0.000 | 0.370* | 0.007 | 0.000 | 0.051 | 0.026 |
| | (.) | (0.175) | (0.344) | (.) | (0.134) | (0.199) |
| Location | -0.027 | -0.087 | -0.034 | -0.052 | -0.322 | 0.350* |
| | (0.190) | (0.084) | (0.116) | (0.094) | (0.181) | (0.138) |
| Managetype | -0.100 | -0.192 | 0.072 | 0.000 | 0.110 | 0.057 |
| | (0.158) | (0.180) | (0.217) | (.) | (0.137) | (0.196) |
| Publicfund | 0.195 | -0.032 | 0.046 | 0.101 | 0.000 | 0.204 |
| | (0.138) | (0.137) | (0.100) | (0.092) | (.) | (0.268) |
| Size | 0.000 | -0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) |
| Immigrant | 0.185 | 0.061 | -0.007 | -0.060* | 0.069 | -0.102 |
| | (0.142) | (0.063) | (0.082) | (0.030) | (0.073) | (0.073) |
| LowSES | -0.082 | -0.056 | -0.034 | -0.055 | -0.069 | 0.196* |
| | (0.101) | (0.056) | (0.048) | (0.044) | (0.064) | (0.079) |
| Teacher Controls | | | | | | |
| Gender | - | 0 174 | -0.033 | 0 339*** | 0.016 | 0 126 |
| | 0.424*** | | 0.0000 | (0.00) | | |
| | (0.128) | (0.128) | (0.088) | (0.096) | (0.101) | (0.091) |
| Age | -0.030* | -0.007 | 0.002 | 0.008 | -0.006 | -0.004 |
| | (0.014) | (0.007) | (0.007) | (0.010) | (0.007) | (0.009) |
| Employstatus | -0.191 | -0.070 | 0.181* | 0.030 | 0.491*** | 0.148 |
| — | (0.536) | (0.124) | (0.089) | (0.222) | (0.148) | (0.106) |
| Experience | 0.040** | 0.018* | 0.009 | 0.005 | 0.009 | 0.010 |
| _ | (0.012) | (0.007) | (0.007) | (0.009) | (0.008) | (0.006) |
| Tenure | -0.047 | 0.106 | -0.151 | -0.167 | 0.057 | 0.153 |
| | (0.136) | (0.126) | (0.124) | (1.106) | (0.164) | (0.246) |

| Table 39 (cont'd) | | | | | | |
|--------------------|----------|-------------------|---------------|--------------|----------|----------|
| Education | 0.656 | 0.277 | 0.068 | 0.115 | -0.086 | -0.334 |
| | (0.364) | (0.197) | (0.088) | (0.107) | (0.137) | (0.181) |
| Training | 0.475 | 0.150 | 0.065 | 0.152 | 0.325 | 0.272 |
| | (0.262) | (0.145) | (0.094) | (0.129) | (0.173) | (0.186) |
| Variance Compone | ent | | | | | |
| Between | 0.091*** | 0.032*** | 0.058*** | 0.044*** | 0.031** | 0.087*** |
| | (0.051) | (0.022) | (0.033) | (0.024) | (0.037) | (0.034) |
| Within | 0.489*** | 0.290*** | 0.429*** | 0.484*** | 0.311*** | 0.269*** |
| | (0.020) | (0.013) | (0.017) | (0.016) | (0.023) | (0.015) |
| Ν | 2371 | 1768 | 1865 | 2531 | 1564 | 1740 |
| | DOL | DDT | DOU | a a b | GDD | 01111 |
| | POL | PRT | ROU | SGP | SRB | SVK |
| Intercept | 0.018*** | 0.000 | 0.027*** | 0.004*** | 0.012*** | 0.009*** |
| | (0.005) | (0.003) | (0.007) | (0.003) | (0.005) | (0.004) |
| Independent Varia | bles | | | | | |
| Devpeople_INF | -0.055 | -0.024 | 0.055 | -0.084 | 0.063 | 0.068 |
| | (0.057) | (0.040) | (0.062) | (0.052) | (0.066) | (0.059) |
| Hire_INF | -0.046 | 0.131 | 0.132 | -0.169 | -0.003 | -0.038 |
| | (0.222) | (0.072) | (0.073) | (0.100) | (0.088) | (0.050) |
| ManInstruct_INF | 0.046 | -0.027 | -0.117* | -0.048 | 0.013 | 0.063 |
| | (0.070) | (0.040) | (0.055) | (0.052) | (0.070) | (0.049) |
| SetDirection_INF | -0.206 | -0.202* | 0.019 | -0.016 | 0.066 | -0.088 |
| | (0.298) | (0.085) | (0.115) | (0.080) | (0.102) | (0.066) |
| SetSalary_INF | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.036 |
| | (.) | (.) | (.) | (.) | (.) | (0.140) |
| Principal and Scho | ol | | | | | |
| Controls | 0.027 | 0.007 | 0.015 | 0.044 | 0.125 | 0.172* |
| Genuer | (0.027) | -0.000 | (0.015) | 0.044 | -0.125 | (0.060) |
| A | (0.091) | (0.000) | (0.084) | (0.080) | (0.074) | (0.009) |
| Age | -0.003 | (0.005) | -0.000 | (0.022) | -0.010 | (0.003) |
| Education | (0.008) | (0.003) | (0.003) | (0.012) | (0.000) | (0.007) |
| Euucation | (0.127) | (0.025) | -0.024 | -0.013 | -0.002 | -0.534 |
| Evnorionco | (0.157) | (0.030) | (0.152) | (0.275) | (0.547) | (0.251) |
| Experience | (0.010) | -0.005 | -0.011 | -0.027 | (0.009) | (0.009) |
| Employatotua | (0.007) | (0.004) | (0.008) | (0.015) | (0.008) | (0.000) |
| Employstatus | (0.221) | (0.233°) | 0.093 | () | () | -0.009 |
| Location | (0.231) | (0.070) | (0.083) | (.) 0.000 | (.) | (0.230) |
| LUCATION | 0.003 | (0.069) | (0.202^{*}) | () | (0.021) | -0.100 |
| | (0.097) | (0.002) | (0.085) | (.) | (0.092) | (0.080) |

| Table 39 (cont'd) | | | | | | |
|-------------------------|----------|----------|----------|----------|----------|----------|
| Managetype | -0.415 | -0.366** | 0.000 | 0.000 | 0.000 | 0.058 |
| | (0.254) | (0.112) | (.) | (.) | (.) | (0.153) |
| Publicfund | -0.131 | -0.067 | 0.015 | 0.513*** | 0.063 | 0.010 |
| | (0.124) | (0.103) | (0.099) | (0.129) | (0.108) | (0.115) |
| Size | 0.000* | 0.000 | -0.000 | 0.000 | -0.000 | -0.000 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Immigrant | 0.180 | 0.052 | -0.078 | -0.024 | -0.051 | -0.026 |
| | (0.146) | (0.058) | (0.046) | (0.041) | (0.066) | (0.041) |
| LowSES | -0.120* | 0.021 | 0.010 | 0.139* | 0.084 | -0.094 |
| | (0.061) | (0.036) | (0.036) | (0.061) | (0.049) | (0.054) |
| Teacher Controls | | | | | | |
| Gender | 0.328*** | 0.149* | 0.218** | 0.325** | 0.126 | 0.355*** |
| | (0.096) | (0.067) | (0.071) | (0.102) | (0.072) | (0.095) |
| Age | 0.007 | 0.002 | 0.002 | 0.027** | 0.000 | 0.003 |
| | (0.010) | (0.008) | (0.006) | (0.010) | (0.007) | (0.008) |
| Employstatus | 0.102 | 0.042 | 0.042 | 0.578** | 0.036 | 0.114 |
| | (0.103) | (0.124) | (0.107) | (0.224) | (0.115) | (0.132) |
| Experience | 0.008 | 0.001 | 0.010 | 0.026* | 0.016* | 0.016* |
| | (0.010) | (0.009) | (0.006) | (0.011) | (0.007) | (0.008) |
| Tenure | 0.170 | 0.051 | 0.085 | 0.240 | -0.008 | 0.080 |
| | (0.166) | (0.084) | (0.074) | (0.128) | (0.119) | (0.095) |
| Education | -0.287 | -0.059 | -0.124 | 0.162 | -0.073 | -0.146 |
| | (0.363) | (0.079) | (0.077) | (0.136) | (0.103) | (0.186) |
| Training | 0.645 | 0.040 | 0.267 | 0.543 | 0.055 | 0.122 |
| | (0.630) | (0.072) | (0.180) | (0.500) | (0.099) | (0.127) |
| Variance Compone | ent | | | | | |
| Between | 0.034*** | 0.000 | 0.088*** | 0.001*** | 0.037*** | 0.029*** |
| | (0.027) | (0.000) | (0.024) | (0.000) | (0.026) | (0.020) |
| Within | 0.349*** | 0.299*** | 0.329*** | 0.442*** | 0.389*** | 0.346*** |
| | (0.012) | (0.010) | (0.013) | (0.013) | (0.015) | (0.012) |
| N | 3158 | 2621 | 3053 | 2641 | 2429 | 3048 |
| | SWE | USA | | | | |
| Intercept | 0.009*** | 0.006*** | - | | | |
| | (0.003) | (0.006) | | | | |
| Independent Varia | bles | | - | | | |
| Devpeople_INF | -0.053 | 0.331** | | | | |
| | (0.066) | (0.120) | | | | |
| Hire_INF | 0.129 | 0.320 | | | | |
| | (0.138) | (0.200) | | | | |

| Table 39 (cont'd) | | |
|---------------------------|---------|---------|
| ManInstruct_INF | -0.162* | -0.128 |
| | (0.069) | (0.086) |
| SetDirection_INF | 0.110 | -0.056 |
| | (0.168) | (0.134) |
| SetSalary_INF | -0.282 | 0.054 |
| | (0.171) | (0.089) |
| Principal and Scho | ol | |
| Controls | | |
| Gender | -0.048 | -0.008 |
| | (0.080) | (0.123) |
| Age | 0.009 | -0.006 |
| | (0.006) | (0.009) |
| Education | 0.124 | 0.057 |
| - | (0.112) | (0.156) |
| Experience | -0.007 | 0.004 |
| | (0.009) | (0.015) |
| Employstatus | 0.000 | 0.494 |
| | (.) | (0.324) |
| Location | 0.125 | 0.263 |
| | (0.101) | (0.149) |
| Managetype | -0.232 | 0.221 |
| | (0.130) | (0.450) |
| Publicfund | 0.000 | -0.263 |
| | (.) | (0.253) |
| Size | 0.000 | 0.000 |
| | (0.000) | (0.000) |
| Immigrant | -0.063 | -0.002 |
| | (0.064) | (0.068) |
| LowSES | 0.101 | 0.075 |
| | (0.070) | (0.064) |
| Teacher Controls | | |
| Gender | 0.123 | 0.154 |
| | (0.077) | (0.119) |
| Age | 0.006 | 0.000 |
| | (0.005) | (0.007) |
| Employstatus | 0.175* | -0.005 |
| | (0.082) | (0.353) |
| Experience | 0.016** | 0.012 |
| | (0.005) | (0.009) |

| Table 39 (cont'd) | | |
|---------------------|------------|----------|
| Tenure | 0.373** | 0.318* |
| | (0.124) | (0.148) |
| Education | 0.031 | 0.146 |
| | (0.078) | (0.336) |
| Training | -0.102 | 0.838*** |
| | (0.152) | (0.229) |
| Variance Compone | ent | |
| Between | 0.044*** | 0.015 |
| | (0.024) | (0.033) |
| Within | 0.323*** | 0.437*** |
| | (0.012) | (0.018) |
| Ν | 2660 | 1519 |
| Standard among in n | anonthagaa | |

Standard errors in parentheses * p<0.05, ** p<0.01, *** p<0.001

APPENDIX H: Meta-analysis Results for the Study

Table 40: Meta-analysis Results of Formal Leaders' Participation in Leadership

| | | Developi | ng Peopl | e | | Hir | ing | |
|---------|--------|----------|----------|-------|--------|--------|--------|-------|
| Country | ES | 95% | 6 CI | % Wt | ES | 95% | 6 CI | % Wt |
| AAD | -0.014 | -0.153 | 0.126 | 2.750 | -0.145 | -0.386 | 0.096 | 1.900 |
| AUS | -0.141 | -0.285 | 0.004 | 2.570 | -0.123 | -0.442 | 0.197 | 1.080 |
| BFL | -0.075 | -0.203 | 0.053 | 3.260 | 0.015 | -0.140 | 0.170 | 4.630 |
| BGR | 0.003 | -0.188 | 0.194 | 1.470 | 0.193 | -0.311 | 0.697 | 0.440 |
| BRA | 0.006 | -0.084 | 0.096 | 6.610 | 0.052 | -0.099 | 0.203 | 4.870 |
| CAB | 0.094 | -0.050 | 0.238 | 2.590 | -0.001 | -0.227 | 0.224 | 2.180 |
| CHL | -0.171 | -0.453 | 0.110 | 0.670 | -0.142 | -0.393 | 0.109 | 1.750 |
| CZE | 0.059 | -0.053 | 0.170 | 4.300 | 0.014 | -0.142 | 0.171 | 4.530 |
| DNK | 0.024 | -0.109 | 0.157 | 3.010 | -0.062 | -0.246 | 0.121 | 3.290 |
| ENG | -0.035 | -0.225 | 0.155 | 1.480 | 0.018 | -0.262 | 0.298 | 1.410 |
| ESP | 0.013 | -0.121 | 0.148 | 2.950 | -0.015 | -0.165 | 0.135 | 4.930 |
| EST | 0.008 | -0.095 | 0.111 | 5.060 | 0.076 | -0.090 | 0.243 | 4.020 |
| FIN | -0.006 | -0.185 | 0.174 | 1.660 | 0.197 | -0.070 | 0.463 | 1.560 |
| FRA | -0.091 | -0.238 | 0.056 | 2.490 | -0.010 | -0.222 | 0.203 | 2.450 |
| HRV | -0.001 | -0.088 | 0.087 | 6.990 | 0.128 | -0.025 | 0.281 | 4.740 |
| ISR | 0.122 | -0.027 | 0.272 | 2.400 | -0.352 | -0.523 | -0.182 | 3.830 |
| ITA | 0.017 | -0.208 | 0.243 | 1.050 | -0.133 | -0.400 | 0.133 | 1.560 |
| JPN | -0.042 | -0.141 | 0.057 | 5.420 | -0.093 | -0.299 | 0.113 | 2.620 |
| KOR | -0.035 | -0.159 | 0.088 | 3.490 | 0.205 | -0.028 | 0.439 | 2.030 |
| LVA | 0.018 | -0.234 | 0.271 | 0.840 | -0.096 | -0.243 | 0.052 | 5.110 |
| MEX | -0.176 | -0.320 | -0.032 | 2.590 | 0.035 | -0.248 | 0.317 | 1.390 |
| MYS | 0.017 | -0.130 | 0.164 | 2.490 | -0.198 | -0.679 | 0.283 | 0.480 |
| NLD | -0.211 | -0.419 | -0.003 | 1.240 | -0.067 | -0.226 | 0.092 | 4.380 |
| NOR | 0.280 | 0.096 | 0.465 | 1.570 | 0.295 | 0.013 | 0.577 | 1.390 |
| POL | 0.018 | -0.095 | 0.131 | 4.170 | -0.039 | -0.377 | 0.298 | 0.970 |
| PRT | 0.099 | 0.025 | 0.173 | 9.780 | 0.010 | -0.106 | 0.125 | 8.320 |
| ROU | -0.012 | -0.135 | 0.111 | 3.520 | -0.076 | -0.235 | 0.083 | 4.380 |
| SGP | 0.006 | -0.183 | 0.195 | 1.500 | -0.053 | -0.186 | 0.081 | 6.180 |
| SRB | 0.015 | -0.139 | 0.169 | 2.250 | 0.040 | -0.130 | 0.210 | 3.830 |
| SVK | -0.014 | -0.138 | 0.111 | 3.450 | 0.040 | -0.092 | 0.171 | 6.370 |
| SWE | 0.229 | 0.124 | 0.333 | 4.920 | -0.087 | -0.406 | 0.232 | 1.090 |
| USA | 0.157 | -0.036 | 0.350 | 1.440 | 0.060 | -0.161 | 0.281 | 2.270 |
| I-V | 0.017 | -0.006 | 0.040 | 100 | -0.012 | -0.045 | 0.021 | 100 |

Responsibilities and its Impact on Teaching Quality

Table 40 (cont'd)

| Heterogeneity chi-squared | 59.14(d.f. = 31), P=0.002 | | | | 40.93 (d.f. = 31), P=0.109 | | | | |
|------------------------------|---------------------------|------------|-----------|-------|----------------------------|--------|-------|-------|--|
| I-squared | 47.60% | | | | 38.1 | 0% | | | |
| Test of ES=0 | | z= 1.46 j | 0 = 0.143 | | z = 2.21 p = 0.027 | | | | |
| Fisher P | | | | | | 0.179 | | | |
| value | | 0.0 | 00 | | 0.179 | | | | |
| | Μ | [anaging] | Instructi | on | Setting Direction | | | | |
| Country | ES | 95% | 6 CI | % Wt | ES | 95% | o CI | % Wt | |
| AAD | 0.040 | -0.115 | 0.195 | 2.480 | -0.038 | -0.260 | 0.183 | 2.090 | |
| AUS | 0.006 | -0.206 | 0.218 | 1.330 | 0.230 | -0.003 | 0.464 | 1.880 | |
| BFL | -0.100 | -0.235 | 0.034 | 3.310 | -0.027 | -0.169 | 0.115 | 5.070 | |
| BGR | -0.011 | -0.153 | 0.131 | 2.960 | -0.083 | -0.335 | 0.168 | 1.620 | |
| BRA | 0.004 | -0.105 | 0.114 | 4.980 | -0.093 | -0.218 | 0.033 | 6.520 | |
| CAB | 0.078 | -0.131 | 0.287 | 1.360 | -0.052 | -0.268 | 0.164 | 2.190 | |
| CHL | 0.285 | 0.057 | 0.512 | 1.150 | -0.225 | -0.698 | 0.247 | 0.460 | |
| CZE | -0.039 | -0.163 | 0.085 | 3.900 | 0.061 | -0.143 | 0.265 | 2.460 | |
| DNK | -0.092 | -0.262 | 0.079 | 2.050 | 0.264 | 0.039 | 0.488 | 2.030 | |
| ENG | 0.148 | -0.013 | 0.308 | 2.320 | 0.176 | -0.062 | 0.414 | 1.810 | |
| ESP | 0.000 | -0.121 | 0.120 | 4.130 | -0.108 | -0.251 | 0.035 | 5.000 | |
| EST | -0.010 | -0.123 | 0.103 | 4.700 | 0.086 | -0.114 | 0.287 | 2.550 | |
| FIN | -0.126 | -0.309 | 0.057 | 1.780 | 0.035 | -0.240 | 0.310 | 1.350 | |
| FRA | -0.011 | -0.139 | 0.117 | 3.660 | 0.006 | -0.109 | 0.122 | 7.650 | |
| HRV | 0.031 | -0.066 | 0.129 | 6.280 | -0.012 | -0.142 | 0.117 | 6.120 | |
| ISR | 0.171 | 0.026 | 0.316 | 2.840 | -0.027 | -0.189 | 0.135 | 3.880 | |
| ITA | 0.049 | -0.126 | 0.224 | 1.950 | 0.030 | -0.238 | 0.299 | 1.420 | |
| JPN | 0.072 | -0.043 | 0.186 | 4.530 | -0.044 | -0.188 | 0.099 | 4.940 | |
| KOR | 0.075 | -0.141 | 0.292 | 1.270 | -0.011 | -0.305 | 0.283 | 1.180 | |
| LVA | 0.056 | -0.077 | 0.190 | 3.360 | 0.163 | 0.002 | 0.325 | 3.930 | |
| MEX | 0.121 | -0.040 | 0.283 | 2.300 | -0.061 | -0.285 | 0.162 | 2.040 | |
| MYS | 0.109 | -0.027 | 0.245 | 3.220 | -0.002 | -0.148 | 0.143 | 4.830 | |
| NLD | 0.031 | -0.136 | 0.198 | 2.140 | 0.126 | -0.087 | 0.338 | 2.260 | |
| NOR | -0.195 | -0.352 | -0.038 | 2.420 | -0.099 | -0.367 | 0.169 | 1.430 | |
| POL | 0.142 | 0.004 | 0.280 | 3.130 | -0.062 | -0.262 | 0.139 | 2.550 | |
| PRT | -0.135 | -0.237 | -0.034 | 5.760 | 0.118 | 0.005 | 0.232 | 7.900 | |
| ROU | -0.003 | -0.114 | 0.107 | 4.890 | -0.072 | -0.267 | 0.124 | 2.690 | |
| SGP | -0.048 | -0.202 | 0.105 | 2.530 | -0.098 | -0.327 | 0.130 | 1.960 | |
| SRB | 0.058 | -0.092 | 0.209 | 2.630 | -0.062 | -0.227 | 0.104 | 3.740 | |
| SVK | -0.061 | -0.177 | 0.056 | 4.390 | -0.008 | -0.184 | 0.169 | 3.270 | |
| SWE | -0.127 | -0.262 | 0.009 | 3.240 | 0.163 | -0.093 | 0.419 | 1.560 | |

Table 40 (cont'd)

| USA | 0.021 | -0.120 | 0.162 | 3.010 | 0.118 -0.135 0.370 1.610 |
|------------------------------|--------------------|-------------|----------|-------|----------------------------|
| I-V | 0.006 | -0.019 | 0.030 | 100 | 0.009 -0.023 0.041 100 |
| Heterogeneity chi-squared | 51 | .00 (d.f. = | 31), P=0 | 0.013 | 33.42 (d.f. = 31), P=0.351 |
| I-squared | 39.20% | | | | 7.20% |
| Test of ES=0 | z = 0.45 p = 0.651 | | | | z = 0.55 p = 0.580 |
| Fisher P | 0.022 | | | | 0.395 |
| value | | 0.0 | | | 0.375 |
| | | Setting | Salary | | _ |
| Country | ES | 95% | 6 CI | % Wt | |
| AAD | 0.225 | -0.142 | 0.592 | 1.520 | |
| AUS | -0.210 | -0.573 | 0.152 | 1.560 | |
| BFL | -0.175 | -0.401 | 0.051 | 4.000 | |
| BGR | -0.238 | -0.499 | 0.023 | 3.000 | |
| BRA | -0.051 | -0.395 | 0.294 | 1.730 | |
| CAB | 1.024 | -0.090 | 2.137 | 0.160 | |
| CHL | 0.232 | -0.224 | 0.687 | 0.990 | |
| CZE | 0.079 | -0.190 | 0.348 | 2.830 | |
| DNK | 0.030 | -0.126 | 0.185 | 8.460 | |
| ENG | -0.131 | -0.400 | 0.137 | 2.830 | |
| ESP | -0.010 | -0.217 | 0.196 | 4.800 | |
| EST | -0.134 | -0.346 | 0.079 | 4.540 | |
| FIN | -0.015 | -0.292 | 0.263 | 2.650 | |
| FRA | 0.238 | -0.353 | 0.830 | 0.580 | |
| HRV | 0.105 | -0.216 | 0.426 | 1.990 | |
| ISR | 0.074 | -0.183 | 0.332 | 3.080 | |
| ITA | 0.192 | -0.324 | 0.708 | 0.770 | |
| JPN | 0.184 | -0.044 | 0.411 | 3.960 | |
| KOR | -0.566 | -1.109 | -0.023 | 0.690 | |
| LVA | -0.083 | -0.257 | 0.091 | 6.750 | |
| MEX | 0.093 | -0.263 | 0.450 | 1.610 | |
| MYS | 0.058 | -0.245 | 0.361 | 2.230 | |
| NLD | -0.076 | -0.317 | 0.166 | 3.510 | |
| NOR | -0.110 | -0.531 | 0.311 | 1.150 | |
| POL | -0.129 | -0.301 | 0.043 | 6.920 | |
| PRT | 0.054 | -0.095 | 0.204 | 9.100 | |
| ROU | -0.168 | -0.479 | 0.143 | 2.110 | |
| SGP | 0.023 | -0.215 | 0.261 | 3.600 | |
| SRB | -0.066 | -0.281 | 0.148 | 4.450 | |
| SVK | 0.004 | -0.185 | 0.194 | 5.690 | |

Table 40 (cont'd)

| SWE | -0.099 | -0.397 | 0.198 | 2.310 |
|------------------------------|--------|--------------|----------|-------|
| USA | -0.300 | -0.982 | 0.382 | 0.440 |
| I-V | -0.026 | -0.071 | 0.019 | 100 |
| Heterogeneity chi-squared | 30. | 07(d.f. = 3) | 31), P=0 | .514 |
| I-squared | | 0.0 | 0% | |
| Test of ES=0 | | z= 1.12 | p = 0.26 | 1 |
| Fisher P value | | 0.4 | -23 | |

Table 41: Meta-analysis Results of Informal Leaders' Participation in Leadership

| Responsibilities and its Imp | act on Teaching Quality |
|------------------------------|-------------------------|
|------------------------------|-------------------------|

| | | Developii | ng Peopl | e | | Hir | ing | |
|---------|--------|-----------|----------|-------|----------|--------|-------|--------|
| Country | ES | 95% | 6 CI | % Wt | ES | 95% | o CI | % Wt |
| AAD | 0.078 | -0.034 | 0.190 | 4.480 | 0.315 | -0.098 | 0.727 | 0.670 |
| AUS | -0.012 | -0.175 | 0.152 | 2.080 | -0.170 | -0.456 | 0.116 | 1.400 |
| BFL | -0.118 | -0.248 | 0.013 | 3.280 | 0.049 | -0.177 | 0.275 | 2.250 |
| BGR | 0.070 | -0.064 | 0.203 | 3.130 | -0.081 | -0.242 | 0.080 | 4.420 |
| BRA | 0.094 | 0.015 | 0.173 | 9.000 | 0.266 | 0.025 | 0.507 | 1.970 |
| CAB | 0.016 | -0.189 | 0.222 | 1.330 | 0.082 | -0.140 | 0.304 | 2.330 |
| CHL | -0.234 | -0.502 | 0.033 | 0.780 | 0.929 | 0.292 | 1.565 | 0.280 |
| CZE | -0.012 | -0.156 | 0.131 | 2.710 | -0.090 | -0.341 | 0.161 | 1.830 |
| DNK | -0.176 | -0.317 | -0.035 | 2.820 | -0.015 | -0.119 | 0.090 | 10.460 |
| ENG | -0.088 | -0.226 | 0.049 | 2.970 | -0.161 | -0.373 | 0.051 | 2.560 |
| ESP | -0.056 | -0.234 | 0.121 | 1.770 | 0.170 | -0.043 | 0.382 | 2.540 |
| EST | -0.048 | -0.175 | 0.079 | 3.450 | 0.043 | -0.075 | 0.161 | 8.220 |
| FIN | -0.327 | -0.842 | 0.189 | 0.210 | 0.140 | -0.357 | 0.636 | 0.470 |
| FRA | -0.028 | -0.192 | 0.135 | 2.100 | 0.379 | 0.045 | 0.714 | 1.020 |
| HRV | -0.004 | -0.122 | 0.113 | 4.070 | -0.021 | -0.137 | 0.096 | 8.430 |
| ISR | 0.216 | 0.077 | 0.355 | 2.900 | 0.080 | -0.105 | 0.265 | 3.360 |
| ITA | 0.047 | -0.244 | 0.338 | 0.660 | (Exclude | ed) | | |
| JPN | 0.031 | -0.065 | 0.126 | 6.120 | 0.179 | -0.131 | 0.489 | 0.520 |
| KOR | -0.148 | -0.340 | 0.044 | 1.520 | 0.224 | -0.247 | 0.696 | 5.460 |
| LVA | 0.051 | -0.139 | 0.241 | 1.550 | 0.070 | -0.075 | 0.215 | 1.050 |
| MEX | -0.050 | -0.201 | 0.101 | 2.460 | 0.317 | -0.013 | 0.647 | 0.310 |
| MYS | 0.040 | -0.080 | 0.159 | 3.920 | -0.260 | -0.864 | 0.344 | 4.130 |
| NLD | 0.023 | -0.164 | 0.211 | 1.590 | 0.133 | -0.034 | 0.300 | 1.740 |

| Table 41 (cont' | (d) | | | | | | | |
|-----------------|--------|------------|-----------|-------|--------|---------------|-----------|--------|
| NOR | 0.284 | -0.161 | 0.728 | 0.280 | 0.045 | -0.212 | 0.302 | 0.600 |
| POL | -0.055 | -0.166 | 0.056 | 4.520 | -0.046 | -0.482 | 0.390 | 5.810 |
| PRT | -0.024 | -0.102 | 0.054 | 9.170 | 0.131 | -0.010 | 0.271 | 5.620 |
| ROU | 0.055 | -0.067 | 0.177 | 3.760 | 0.132 | -0.011 | 0.274 | 3.010 |
| SGP | -0.084 | -0.185 | 0.017 | 5.450 | -0.169 | -0.364 | 0.026 | 3.900 |
| SRB | 0.063 | -0.066 | 0.192 | 3.360 | -0.003 | -0.174 | 0.169 | 12.140 |
| SVK | 0.068 | -0.048 | 0.183 | 4.190 | -0.038 | -0.136 | 0.059 | 1.560 |
| SWE | -0.053 | -0.182 | 0.075 | 3.360 | 0.129 | -0.142 | 0.400 | 0.750 |
| USA | 0.331 | 0.095 | 0.567 | 1.000 | 0.320 | -0.072 | 0.712 | 0.880 |
| I-V | 0.004 | -0.019 | 0.028 | 100 | 0.038 | 0.004 | 0.072 | 100 |
| Heterogeneity | | | | | | | | |
| chi-squared | 54 | 50(d.f.=3) | 1), P=0.0 | 006 | 48.4 | 49 (d.f. = 1) | 30), P=0 | .018 |
| I-squared | | 43.2 | 20% | | | 38.1 | 0% | |
| Test of ES=0 | | z= 0.35 | p = 0.729 |) | | z= 2.21 | p = 0.02 | 7 |
| Fisher P | | | | | | | | |
| Value | | 0.0 | 07 | | | 0.0 | 04 | |
| | Μ | lanaging 1 | Instructi | on | 1 | Setting I | Direction | 1 |
| Country | ES | 95% | ό CI | % Wt | ES | 95% | 6 CI | % Wt |
| AAD | -0.102 | -0.235 | 0.030 | 2.780 | 0.023 | -0.385 | 0.431 | 0.780 |
| AUS | -0.080 | -0.242 | 0.081 | 1.880 | 0.062 | -0.207 | 0.331 | 1.790 |
| BFL | -0.049 | -0.166 | 0.068 | 3.560 | -0.090 | -0.324 | 0.145 | 2.340 |
| BGR | 0.042 | -0.122 | 0.207 | 1.800 | -0.250 | -0.437 | -0.063 | 3.690 |
| BRA | -0.063 | -0.151 | 0.025 | 6.310 | -0.160 | -0.305 | -0.016 | 6.190 |
| CAB | 0.091 | -0.054 | 0.235 | 2.350 | -0.300 | -0.533 | -0.066 | 2.370 |
| CHL | -0.034 | -0.244 | 0.176 | 1.110 | -0.672 | -1.190 | -0.155 | 0.480 |
| CZE | 0.006 | -0.089 | 0.101 | 5.400 | 0.131 | -0.015 | 0.276 | 6.070 |
| DNK | -0.008 | -0.140 | 0.124 | 2.820 | 0.026 | -0.093 | 0.146 | 9.040 |
| ENG | 0.131 | -0.003 | 0.266 | 2.700 | 0.516 | 0.212 | 0.820 | 1.400 |
| ESP | -0.149 | -0.279 | -0.019 | 2.890 | -0.070 | -0.282 | 0.141 | 2.880 |
| EST | 0.116 | 0.029 | 0.202 | 6.540 | 0.036 | -0.138 | 0.209 | 4.280 |
| FIN | -0.014 | -0.172 | 0.144 | 1.960 | -0.043 | -0.279 | 0.194 | 2.310 |
| FRA | -0.040 | -0.166 | 0.086 | 3.090 | 0.107 | -0.079 | 0.294 | 3.720 |
| HRV | 0.061 | -0.055 | 0.176 | 3.660 | -0.028 | -0.217 | 0.161 | 3.620 |
| ISR | -0.098 | -0.233 | 0.036 | 2.690 | -0.041 | -0.261 | 0.179 | 2.670 |
| ITA | 0.098 | -0.117 | 0.313 | 1.060 | -0.064 | -0.252 | 0.123 | 3.690 |
| JPN | -0.003 | -0.104 | 0.099 | 4.740 | 0.052 | -0.157 | 0.260 | 2.960 |
| KOR | 0.089 | -0.073 | 0.251 | 1.860 | 0.025 | -0.202 | 0.253 | 2.500 |
| LVA | 0.075 | -0.070 | 0.220 | 2.310 | -0.136 | -0.336 | 0.065 | 3.210 |
| MEX | -0.069 | -0.204 | 0.066 | 2.670 | 0.076 | -0.171 | 0.323 | 2.120 |

Table 41 (cont'd)

| MYS | 0.091 | -0.085 | 0.268 | 1.570 | -0.041 | -0.270 | 0.189 | 2.460 |
|--|---|--|---|--|--------|------------|-----------|-------|
| NLD | 0.038 | -0.137 | 0.213 | 1.600 | -0.092 | -0.384 | 0.201 | 1.510 |
| NOR | 0.064 | -0.174 | 0.301 | 0.860 | -0.394 | -0.750 | -0.038 | 1.020 |
| POL | 0.046 | -0.091 | 0.184 | 2.570 | -0.206 | -0.790 | 0.378 | 0.380 |
| PRT | -0.027 | -0.105 | 0.051 | 8.000 | -0.202 | -0.368 | -0.035 | 4.660 |
| ROU | -0.117 | -0.225 | -0.009 | 4.220 | 0.019 | -0.207 | 0.245 | 2.530 |
| SGP | -0.048 | -0.151 | 0.054 | 4.620 | -0.016 | -0.173 | 0.141 | 5.250 |
| SRB | 0.013 | -0.125 | 0.150 | 2.590 | 0.066 | -0.135 | 0.267 | 3.210 |
| SVK | 0.063 | -0.033 | 0.158 | 5.350 | -0.088 | -0.216 | 0.041 | 7.810 |
| SWE | -0.162 | -0.297 | -0.027 | 2.690 | 0.110 | -0.218 | 0.439 | 1.200 |
| USA | -0.128 | -0.297 | 0.040 | 1.720 | -0.056 | -0.319 | 0.206 | 1.870 |
| I-V | 0.009 | -0.031 | 0.014 | 100 | -0.037 | -0.073 | -0.001 | 100 |
| Heterogeneity | | | | | | | | |
| chi-squared | 47. | 52 (d.f. = | 31), P=0 | 0.029 | 54. | 76 (d.f. = | 31), P=0 | .005 |
| I-squared | | 34.8 | 30% | | | 43.4 | 40% | |
| Test of ES=0 | | z= 0.76 | $p = 0.44^{\circ}$ | 7 | | z= 2.00 | p = 0.043 | 5 |
| Fisher P | | | | | | | | |
| Value | | 0.0 | 27 | | | 0.0 | 05 | |
| | | Setting | Salary | | | | | |
| Country | FS | 050/ | | 0/ 3374 | | | | |
| Country | ĽЭ | 95% | | %0 VV L | | | | |
| AAD | -0.361 | -0.797 | 0.074 | % Wt 1.900 | - | | | |
| AAD AUS | -0.361 (Exclude | -0.797 ed) | 0.074 | <u>% wt</u> 1.900 | - | | | |
| AAD AUS BFL | -0.361 (Exclude (Exclude | -0.797 ed) ed) | 0.074 | <u>% Wt</u> 1.900 | | | | |
| AAD AUS BFL BGR | -0.361 (Exclude (Exclude -0.031 | -0.797 ed) ed) -0.216 | 0.074 0.154 | 96 VVI 1.900 10.500 | - | | | |
| AAD AUS BFL BGR BRA | -0.361 (Exclude (Exclude -0.031 0.152 | -0.797 ed) ed) -0.216 -0.196 | 0.074 0.154 0.500 | 1.900 10.500 2.980 | - | | | |
| AAD AUS BFL BGR BRA CAB | -0.361 (Exclude (Exclude -0.031 0.152 0.110 | -0.797 ed) ed) -0.216 -0.196 -0.565 | 0.154 0.500 0.785 | 1.900 10.500 2.980 0.790 | | | | |
| AAD AUS BFL BGR BRA CAB CHL | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) | 0.074 0.154 0.500 0.785 | % WL 1.900 10.500 2.980 0.790 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) | 0.074 0.154 0.500 0.785 | % Wt 1.900 10.500 2.980 0.790 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) -0.300 | 0.074 0.154 0.500 0.785 0.056 | % WL 1.900 10.500 2.980 0.790 11.440 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) -0.300 -0.297 | 0.074 0.154 0.500 0.785 0.056 0.139 | % WL 1.900 10.500 2.980 0.790 11.440 7.600 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) -0.300 -0.297 -0.174 | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 | % WL 1.900 1.900 10.500 2.980 0.790 11.440 7.600 9.850 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) -0.300 -0.297 -0.174 -0.711 | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % WL 1.900 1.900 10.500 2.980 0.790 11.440 7.600 9.850 4.580 1.580 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) -0.300 -0.297 -0.174 -0.711 ed) | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % WL 1.900 1.900 10.500 2.980 0.790 0.790 11.440 7.600 9.850 4.580 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN FRA | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) ed) -0.300 -0.297 -0.174 -0.711 ed) ed) | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % Wt 1.900 1.900 10.500 2.980 0.790 11.440 7.600 9.850 4.580 4.580 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN FRA HRV | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) -0.300 -0.297 -0.174 -0.711 ed) ed) ed) | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % WL 1.900 1.900 10.500 2.980 0.790 0.790 11.440 7.600 9.850 4.580 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN FRA HRV ISR | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude (Exclude (Exclude (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) -0.300 -0.297 -0.174 -0.711 ed) ed) ed) -0.732 | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % Wt 1.900 1.900 10.500 2.980 0.790 0.790 11.440 7.600 9.850 4.580 7.480 0.480 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN FRA HRV ISR ITA | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude (Exclude (Exclude (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) -0.300 -0.297 -0.174 -0.711 ed) ed) ed) ed) -0.732 ed) | 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 -0.293 | % WL 1.900 1.900 10.500 2.980 0.790 0.790 11.440 7.600 9.850 4.580 7.480 7.480 | | | | |
| AAD AUS BFL BGR BRA CAB CHL CZE DNK ENG ESP EST FIN FRA HRV ISR ITA JPN | -0.361 (Exclude (Exclude -0.031 0.152 0.110 (Exclude (Exclude -0.122 -0.079 0.018 -0.430 (Exclude (Exclude (Exclude (Exclude (Exclude (Exclude (Exclude | -0.797 ed) ed) -0.216 -0.196 -0.565 ed) -0.300 -0.297 -0.174 -0.711 ed) ed) ed) ed) -0.732 ed) | 0.074 0.074 0.154 0.500 0.785 0.056 0.139 0.209 -0.149 | % Wt 1.900 10.500 2.980 0.790 11.440 7.600 9.850 4.580 7.480 | | | | |

| Table 41 | (cont'd) |
|----------|----------|
|----------|----------|

| | / | | | | | |
|---------------|---------------------------|--------|-------|--------|--|--|
| LVA | -0.031 | -0.188 | 0.127 | 14.530 | | |
| MEX | 0.702 | 0.339 | 1.064 | 2.750 | | |
| MYS | 0.425 | -0.408 | 1.258 | 0.030 | | |
| NLD | (Excluded) | | | | | |
| NOR | 0.266 | -0.020 | 0.552 | 4.430 | | |
| POL | (Excluded) | | | | | |
| PRT | (Excluded) | | | | | |
| ROU | (Excluded) | | | | | |
| SGP | (Excluded) | | | | | |
| SRB | (Excluded) | | | | | |
| SVK | 0.036 | -0.239 | 0.311 | 4.790 | | |
| SWE | -0.282 | -0.618 | 0.053 | 3.200 | | |
| USA | 0.054 | -0.121 | 0.228 | 11.870 | | |
| I-V | -0.049 | -0.109 | 0.011 | 100 | | |
| Heterogeneity | 57 10(1.6 15) D.0.000 | | | | | |
| ch1-squared | 57.12(d.t. = 15), P=0.000 | | | | | |
| I-squared | 73.70% | | | | | |
| Test of ES=0 | z = 1.61 p = 0.107 | | | | | |
| Fisher P | | | | | | |
| Value | 0.000 | | | | | |

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