Spring 4-23-2020

SCHOOL AUTONOMY DISTRIBUTED LEADERSHIP AND TEACHERS' USE OF INNOVATIVE TEACHING PRACTICES

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by

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A Dissertation

Presented to the Faculty of
The Graduate College at the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy

Major: Educational Studies
(Educational Leadership & Higher Education)

Under the Supervision of Professor Jiangang Xia

Lincoln, Nebraska

April 2020

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University of Nebraska, 2020

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The primary aim of this research is to understand how school autonomy and distributed leadership supports teachers' use of innovative teaching practices. Innovative practices such as increasing cognitive activation and enhanced curricular activities have shown to have significant positive effects on student outcomes (Le Donné, Fraser, & Bousquet, 2016). Based on internationally representative samples including 7,436 lower secondary school principals and 117,876 teachers from 34 countries surveyed in the Teaching and Learning International Survey (TALIS) 2013 data, this study analyzed the effect of school autonomy and distributed leadership on teachers' use of these innovative teaching practices. The findings demonstrate that distributed leadership has a significant and positive impact on teachers' use of innovative teaching practices. School autonomy for budgeting and staffing were significant and positive predictors of cognitive activation while school autonomy for instructional policies was a significant and negative predictor of teachers' use of innovative teaching practices. Conclusions, limitations, and recommendations for further research are discussed.

Keywords: School Autonomy, Distributed Leadership, Innovative Teaching Practices, Future-Ready Students, 21st Century Skills, Multilevel Structural Equation Modeling

Acknowledgements

I am forever thankful to my family and friends for their support during this journey towards my Ph.D. Thank you to my wife, Amber, for being the best support system that I could ask for as I chose to continue my education towards my doctorate as a graduate student. Thank you to my son Elliott for inspiring me never to give up. Thank you to my parents, Sue, and John, for their constant encouragement, guidance, and support since the beginning of my academic career as Mr. C. To my brother Brennan, for being a constant source of inspiration. Thank you to my mentors Dr. Sarah Zuckerman, Dr. Scott McLeod, and Dr. Nick Pace, for helping me improve as a writer, for the uplifting words of confidence, and the countless conversations about academia. Finally, I want to express my sincere gratitude to my advisor Dr. Jiangang Xia for guiding me throughout my Ph.D. process, and Dr. Jessica Namkung for supporting me as a committee member.

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List of Abbreviations

CFA.....Confirmatory Factor Analysis

MCFA .....Multilevel Confirmatory Factor Analysis

SEM .....Structural Equation Modeling

MSEM.....Multilevel Structural Equation Modeling

HLM.....Hierarchal Linear Modeling

TALIS .....Teaching and Learning International Survey

OECD.....Organization for Economic Cooperation and Development

Chapter 1

Introduction

Schools are tasked with the duty of equipping students for their future with the knowledge and skills necessary to thrive as local and global society members (World Economic Forum WEF, 2020). One current framework is the Six C's of education, which include 21st-century skills: connectivity, citizenship, communication, critical thinking, collaboration, creativity (Fullan & Scott, 2014). These six skills are what is considered necessary for students to be able to adapt and thrive in an evolving society. Education systems around the world are attempting to reform their curricula, assessment frameworks, and teaching practices in an attempt to better prepare their students for their future (WEF, 2020). Through the use of innovative teaching practices, educators can develop 21st-century skills in their students, which in turn will help prepare them for their future. The primary aim of this study is to understand how school autonomy and distributed leadership impact the initial step in this process: teachers' use of innovative instructional practices.

Through a better understanding of some of the characteristics that enhance teachers' use of innovative teaching practices educational leaders can help better develop future-ready students. This chapter is organized into the following sections: (a) overview of the issues, (b) purpose of the study, (c) research questions, (d) significance of the study, and (e) limitations of the study.

Overview of the Issue

Future-ready students. Currently, there is little consensus on what constitutes world-class education; a fundamental question shared by education systems worldwide is: How do we prepare future-ready students (Seong, 2019). The concept of future-ready students can be understood as learners who are prepared to succeed in college and the workforce, as well as become productive citizens in society (Fletcher, Edward, Warren, & Hernández-Gantes, 2018). From the school perspective, preparing future-ready students assumes that the learning outcomes selected must be dynamic and aligned with the new realities that emerge over time, realities that are context situated and dependent (Seong, 2019). One aspect of these emerging realities is that employment opportunities are increasingly more centered around jobs that are service-oriented (see Figure 1). This is important for schools because it demonstrates that students must be prepared beyond only high academic grades. Schools need to step away from outdated methods of instruction and adopt suitable practices that promote inquiry, including questioning, learning, and deeper thinking to help students be more ready for their futures (Seong, 2019).

As societies are advancing and changing with new technologies and workforce requirements, a relevance gap can develop between the work being done in schools and the needs of a society (McLeod & Shareski, 2018). A relevance gap then becomes the difference between what is being taught in the schools and what is going to be essential for students' future lives (Perkins, 2014). In his book, Perkins continues by explaining

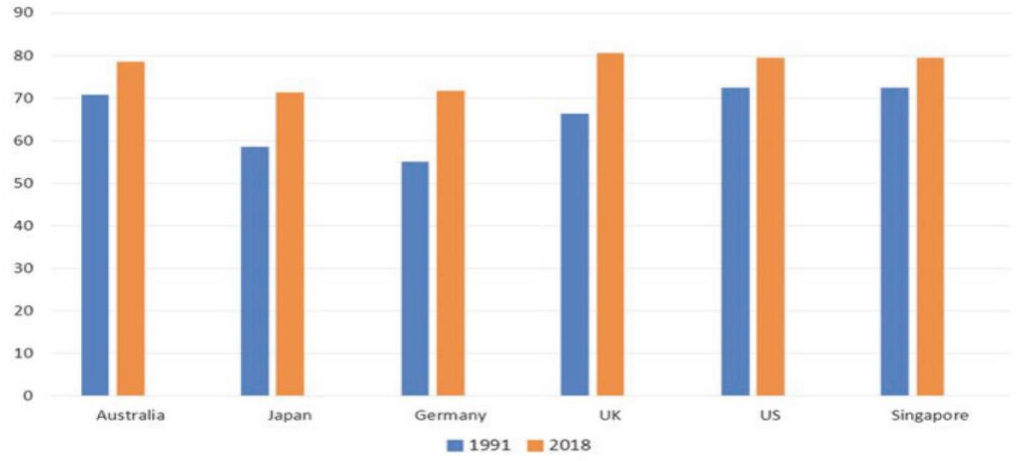


Figure 1. Employment in services (% of total employment country comparison 1991-2018 (Seong, 2019)).

that the difference between the achievement gap and the relevance gap is about understanding the need for the learning. If the achievement of students is in an archaic or outdated area of education (i.e., memorizing the quadratic formula), then it may not matter to the learner's actual futures.

Brown (2015) points out that this type of relevance gap can have detrimental effects on critical school elements such as student engagement and teacher retention. To address this gap, many authors, including McLeod and Shareski (2018), point to school transformation from previous teaching practices and methods to innovative ones that may better prepare students to be future-ready. To do this, teachers and leaders need to be able to engage in collaborative inquiry to build the capacity of both the participating staff and the school as a whole. Leaders learn alongside teachers and staff members, ensuring that professional learning activities are supported and appropriate (Thomas, 2016).

21st century skills. Two decades into the 21st century, the landscape of the educational world has changed (Anugerahwati, 2019). To prepare students to be future-ready, teachers and school systems are under pressure to design lessons that engage students in ways that focus on problem-solving, collaboration, and knowledge construction (Koh, Chai, Benjamin, & Hong, 2015). The new conditions that exist and impact all students pose new challenges and opportunities for students for which they should be educated (Anugerahwati, 2019). The term 21st-century skills was created to point out the aspects that should be integrated into daily lessons in all subject matter (Anugerahwati, 2019). Fullan and Scott's (2014) Six C's of education are designed to prepare students in a way that they can be creative and problem-solvers for future jobs that we cannot imagine (Anugerahwati, 2019).

Innovative teaching practices. Traditional models of instruction have been criticized for hampering teacher's ability to develop students who can keep up with the challenges of modern society (Hermans, Tondeur, van Braak, & Valcke, 2008). Traditional models of instruction tend to be more lecture driven and focus more attention on rote memorization and pay less attention to student differentiation (Ainely & Carstens, 2018). This is detrimental to students, as future jobs are most likely going to require collaboration with peers and problem-solving skills (WEF, 2020). Still, many education systems rely heavily on passive forms of learning focused on direct instruction rather than interactive practices that promote critical thinking and collaboration (see Figure 2). Innovative teaching practices, conversely, are intended to move instruction away from drill-and-practice lessons where the information is transmission focused (Starkey, 2010).

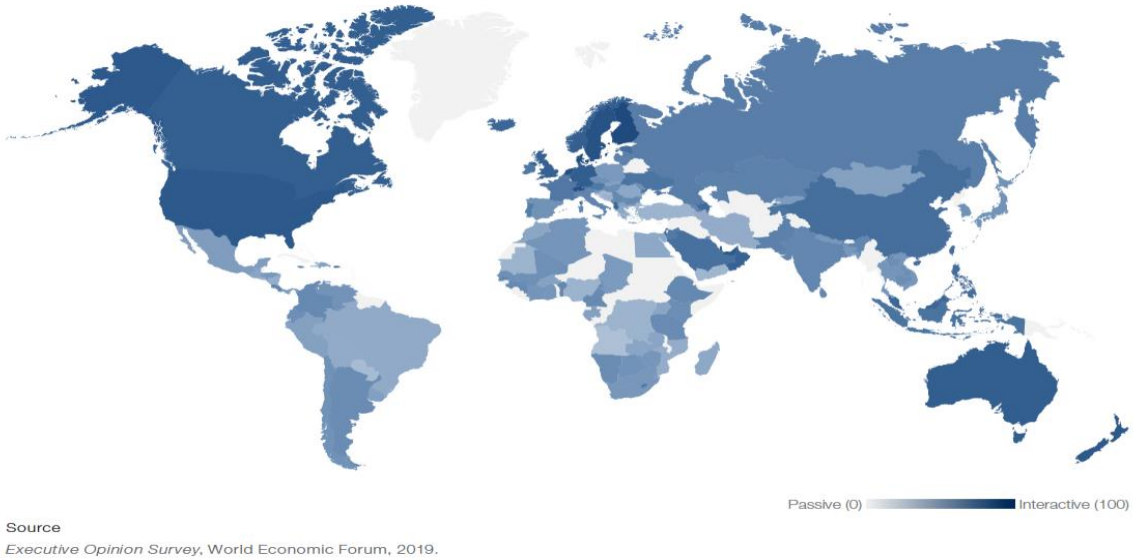


Figure 2. In your country, how do you characterize the style of teaching?

Innovative teaching practices in this study can be defined as ones that deviate from the traditional lecture model and seek to develop high-level skills for students (Le Donné et al., 2016). Specifically, this study looks at practices that develop higher-order thinking skills, allow students to work collaboratively in groups, or utilize technology as a means of enhancing lessons. For example, when looking at higher-order thinking, when teachers use student self-evaluation as a practice they are asking students to do more than just find a solution. Through self-evaluation students have to think metacognitively about their own learning. This metacognitive thinking is an example of cognitive activation.

Allowing students to use Information Communication Technology (ICT) such as computers can enhance tasks that have been previously ingrained in the curriculum. An example of this would be the time-honored classic book report. This practice required

students to read a book and report out to the class. Projects like this do offer some important learning for students, but through ICT students could select from many different books and then choose their own delivery method whether that be slides, videos, cartoons etc. Enhanced activities as an innovative practice looks to allow students more freedom in their learning.

One issue that arises is the diverse understanding of the term "innovative." These practices may be old hat for some educators as they have been utilizing many of these practices for years. That is a fair argument, however, for many teachers and students these practices are not being used. In a similar international study, Echazarra, Salinas, Mendez, Denis, and Rech (2016) found that only one-third of students were exposed to these types of teaching practices. Though there are other teaching practices that could be seen as more innovative than the ones used in this study, it is important to have a starting point for the conversation around innovation to then build from.

One way in which schools have attempted to adapt is by adopting innovative teaching practices that may be more effective or efficient for student learning (Hermans et al., 2008). The Organization for Economic Cooperation and Development (OECD) defines innovative teaching practices as "a range of teaching practices that allow students to think, evaluate, collaborate, and build a variety of skills across the curriculum" (OECD, 2019). The goal of these instructional practices, as defined by OECD, is to enhance learning activities for students and tasks that promote more profound levels of critical thinking and cognitive activation An example of this adoption of more innovative instructional practices would be utilizing more complex problems for students to solve as

opposed to a high volume of simple single-step questions. Findings show that there is a clear link between the frequency of practices that require students to use critical-thinking skills, problem-solving, and decision-making with higher mathematics performances (Le Donné et al., 2016).

There is a consensus in the research community that teaching practices are multidimensional, and their efficiency depends on the context in which they are applied. In other words, there is no single teaching strategy that guarantees the improvement of educational outcomes. Instead, it is the combination of techniques and practices that seems to be the best approach for instructional quality (Hattie & Learning, 2009). Furthermore, teacher practices are not only related to students' cognitive outcomes, but also student attitudes towards learning, motivation, absenteeism, suspensions, and grades (Le Donné et al., 2016). From the teachers' perspective, the level of decision making that a teacher can have in a school is also associated with their job satisfaction and sense of self-efficacy, so it is relevant to explore the specific teaching practices used in classrooms (Echazarra et al., 2016; Le Donné et al., 2016).

Creating an environment for the process. For students to be future-ready, they need 21st-century skills, which can be developed through the use of innovative teaching practices. To do this work requires developing an environment that will support the learning culture (Kimwarey, Chirure, & Omondi, 2014; Zhao, Pugh, Sheldon, & Byers, 2002). In the Teaching and Learning International Survey (TALIS) (2013), there was a significant difference between schools' adoption of teaching practices (Le Donné et al., 2016). Teachers working in the same schools tend to adopt similar styles and

instructional practices as their colleagues more so than teachers in different schools (Le Donné et al., 2016). This crucial finding demonstrates the effects of school culture on classroom practices. The school "teaching culture" could then be heavily influenced by policies or practices or particular leadership styles (Echazarra et al., 2016).

School leadership could develop a shared vision and understanding by developing a supportive learning culture (Kimwarey et al., 2014). This type of supportive school culture is characterized by teacher empowerment through the participatory decision making and is associated with increased student learning (Kimwarey et al., 2014). A supportive learning structure in a school not only enhances teachers' autonomy through shared decision making, but it also allows teachers to trust one another and take risks while collaborating freely about their success and setbacks (McCharen, Song, & Martens, 2011). This trust is essential as Zhao and colleagues (2002) found that the degree to which peers supported or discouraged one another had a significant impact on the successful implementation of innovations. Similar to teachers, principal attitudes, and motivation to implement is paramount to creating an environment for successful implementation (Le Donné et al., 2016).

School autonomy. Based on OECD findings, researchers have found that schools perform better when they are allowed to make decisions about what textbooks they want to use, how to spend their budgets, and which teachers they want to hire (Neeleman, 2019). TALIS (2013) examined school autonomy along the same line by asking principals about their autonomy in instructional policies, budgeting, and staffing. It is necessary to look at the complete picture of school autonomy as opposed to picking one

area over another since educational systems are so unique. For example, in Shanghai-China, there are high levels of school autonomy in the field of budgeting with low levels of autonomy in instructional policies (Neeleman, 2019). This is precisely the opposite in countries like New Zealand and Korea. Therefore, specification is critical as the differences between autonomous systems can be misconstrued.

School autonomy in practice is more than policy, as research has shown that policies to enhance school autonomy does not necessarily lead to increased autonomy in practice (Neeleman, 2019). There is a real need to understand more about school leadership and how capacity through school autonomy results in better outcomes for students (Neeleman, 2019).

In their study of the importance of principal leadership for school success, González-Falcón, Garcia-Rodriguez, Gómez-Hurtardo, and Carrasco-Macias (2019) note the fundamental part principals play; “the literature likewise acknowledges the decisive role of school principals not only in the creation of the provisions for innovation and improvement but also, more importantly, in maintaining them” (p. 2). Principals then have a commitment to manage and lead the initiatives; however, the context of the school matters.

Similar to the findings of OECD, Bloom and Owens (2013) found that principals in higher-achieving urban schools perceived a higher level of influence on hiring and curriculum issues than principals from lower-achieving urban schools. They pointed out how school autonomy in decision making was related to the school’s success. The

authors recommended a better understanding of how school autonomy allows principals the ability to distribute leadership tasks.

Distributed leadership. When developing and communicating a shared vision, it is essential to include as many stakeholders as possible as educational reforms can fail due to a misunderstanding of the school's vision (Hermans et al., 2008). Therefore, teachers and principals alike need to not only be involved in the decision-making process, they need to be able to articulate the vision and have the autonomy to make changes, as necessary.

Distributed leadership can be defined as the practice where leadership is viewed as a product of the interactions of school leaders, followers, and their situations (Spillane, 2005). Distributed leadership focuses on the interactions between individuals as opposed to only the actions of those in formal leadership roles (Harris, 2013). Distributed leadership reflects an effort to reconceptualize leadership in schools by exploring how leadership is "stretched" over the practice of two or more leaders (Spillane, 2006), which increases the mental cognition applied to leadership practice and the capacity of those involved. Research has highlighted the positive influence of this leadership model on organizational conditions (Hallinger, 2011) and student achievement (Hallinger & Heck, 2010; Louis et al., 2010).

In the TALIS (2013) survey from OECD, distributed leadership is measured through the participation among stakeholders. The stakeholders include teachers, parents, and students. The survey asks teachers if the school provides each type of stakeholder an opportunity to participate in school decisions. This distinction is central as it

demonstrates how distributed leadership as a construct is developed as well as its relationship with autonomy. This relationship to autonomy is significant for this study as it looks to see what teachers do when they have more decision-making power. As schools look to prepare students for their future through the development of 21st-century skills, which can be advanced by applying innovative teaching practices, the question becomes what can educational leaders do to support them?

Problem Statement

Teaching, leadership, and innovation are all incredibly sophisticated concepts. While there is little consensus on what constitutes an outstanding education, a common question for schools worldwide is how to prepare future-ready students (Seong, 2019). For schools to keep up with the ever-changing world, there is a belief that schools need to develop students who are well versed in 21st-century skills (Ainely & Carstens, 2018). Traditional models of instruction have been criticized for hampering teacher's ability to develop students who can keep up with the challenges of modern society (Hermans et al., 2008). Students need skills that will allow them to adapt and be flexible in their thinking. One way to develop these 21st-century skills is to utilize innovative teaching practices. What needs to take place for this progression to be successfully implemented in the environment in which students, teachers, and principals interact? If the goal of educational systems is to prepare future-ready students, it seems tenable to focus on ways in which to foster school environments where innovative teaching practices can be used more frequently.

Understanding what educators can do to better prepare students for their future is only half of the issue. The other key component is how? School leadership has often been described as one of the most influential components in a school, second only to classroom teaching, in student success (Leithwood, Louis, Anderson, & Wahlstrom, 2004). Considering the substantial influence leadership has on school outcomes, and the goal of preparing future-ready students, an examination of how leadership impacts the frequency in which teachers use innovative teaching practices seems vital. Focusing on traditionally studied leadership styles does not sufficiently consider the complex nature that encompasses the promotion of progression of innovation in schools (Zacher & Rosing, 2015). While some leadership theories, such as Ambidextrous Leadership Theory for Innovation (Zacher & Rosing, 2015), focus on the intricate associations between leadership and innovation, they do not account for the work being done on the individual level. Analyzing school autonomy from the principal perspective and distributed leadership from the teacher perspective allows for a focus on the individual. Autonomy can then provide school leaders and teachers the capacity to make decisions that are likely to make a difference in student outcomes (Caldwell, 2016).

A problem arises when trying to quantify the role of school autonomy and distributed leadership. In the literature, the impact that autonomy has is unclear. Some authors such as Caldwell (2016) believe that autonomy is important, but it must be balanced with capacity or it will have no impact at all. Others such as OECD and colleagues (2014) and Neeleman (2019) believe that for educators to be able to innovate, their autonomy is critical. If the goal of education is to prepare students for their future

we need to identify what factors contribute to the initial step. How does empowering educators through school autonomy and distributed leadership impact their use of innovative teaching practices? By analyzing how school autonomy and distributed leadership impacts the frequency in which teachers use innovative teaching practices in their classrooms, we can identify the role leadership plays and what factors contribute to the initial step of developing future-ready students.

Purpose of the Study

The primary aim of this study is to understand how school autonomy and distributed leadership impacts the initial step in the progression of developing future-ready students. Caldwell (2016) explained that there is no direct association between higher levels of autonomy and innovation in schools. This finding comes from his work with five schools in Australia. He goes on to explain that from the OECD and colleagues (2014) on the results of the TALIS (2013) survey, and he found "no compelling evidence of noteworthy connections between autonomy and innovation" (p. 15). Interestingly, Caldwell (2016) later mentions that high levels of school autonomy may allow schools to be more innovative, but that it requires capacity and an environment where educators can take risks. In their large-scale study on school-based management, a system characterized by higher autonomy schools, Leithwood and Menzies (1998) explained that there is virtually no firm, research-based evidence about the direct or indirect effects of school-based management on students and the evidence that does exist suggests the impact on students are negligible.

These findings are in stark contrast to those presented by OECD and colleagues (2014) as well as those of Neeleman (2019) who found that higher levels of autonomy were associated with increased student outcomes. These conflicting views require further exploration. This study seeks to do just that. Student outcomes in this regard refer to student preparation to be future-ready. By analyzing the relationship between school autonomy and distributed leadership and the initial step in the progression of developing future-ready students, the frequency of which teachers utilize innovative teaching practices in their classrooms, we can further our understanding of the role of autonomy in education.

A better understanding of the combination of school autonomy and distributed leadership could also allow practitioners and policymakers interested in developing future-ready students the ability to utilize a distributed leadership approach and/or promote school autonomy. Conversely, findings from this study could demonstrate the need to have centralized education systems where decision-making is more consolidated. This study is guided by two research questions:

Research Questions

1. To what extent is distributed leadership related to teachers' use of innovative teaching practices?
2. To what extent is school autonomy in staffing, budgeting, and instructional policies related to teachers' use of innovative teaching practices?

Significance of the Study

Currently, there is an increasing demand for developing and implementing innovations that could improve education (Moolenaar, Daly, & Sleegers, 2010). While there may be some disparities about what constitutes innovation in education, there is a clear and long understanding that leadership is vital in both developing and sustaining innovation (Bass & Riggio, 2006). The importance of leadership is evident: what is unknown is, does it matter who is making the decisions? Le Donné et al. (2016) point out the necessity for teachers and administrators alike to be motivated to impact change. Are they more motivated when they are given the autonomy to make context-related decisions? How does decision-making influence practice?

The focus on innovation in this study is different than most in that it does not aim to study the development or examine the implementation of one specific strategy, but the incorporation of tasks that require problem-solving, collaboration, and knowledge construction. Though studies that analyze development and implementation of one strategy are incredibly useful, this study contributes to the field by identifying a broad set of practices focused on teaching practices designed to foster innovation (OECD, 2019). As teachers are working in a school where the principal's decision-making impacts them, it makes sense to address the study from a nested perspective. To better account for the nested nature of schools, multilevel modeling will allow for teachers' and principals' perspectives within the same school to be analyzed simultaneously.

This study will contribute new knowledge to the field by identifying the extent to which school autonomy and distributed leadership are related to teachers' use of

innovative teaching practices. The findings will illuminate the components of the school autonomy and distributed leadership that have a more considerable influence on innovative teaching practices, or they may show that neither school autonomy or distributed leadership are strong predictors of how often teachers use innovative teaching practices.

Principals, policymakers, and teachers alike will benefit from the knowledge generated from this study. Principals would be able to better advocate for their ability to have more autonomy in decision-making at their school if it is found that school autonomy or distributed leadership are positively related to the increased use of innovative teaching practices. Policymakers will benefit from the results as well. The findings of the study will help them to develop plans and policies where schools are given a higher level of autonomy over decisions that affect them. This will allow principals and teachers the ability to be more flexible (Le Donné et al., 2016) to their students' needs and avoid any red tape that might impede their progress from a district or state level. Teachers will benefit from this study through a better understanding of how decision-making impacts their practice. One of the main precursors for the use of innovative teaching practices is for teachers and principals alike to be amenable to the practices. When teachers are afforded the option to make more of the decisions in their school, will those decisions lead to the increased use of teaching practices aimed at developing future-ready students? This study will allow teachers, principals, and policy makers a better understanding how decision-making impacts practice.

Definitions of Terms

Future-ready students—learners who are prepared to succeed in college and in the workforce, as well as become productive citizens in society (Fletcher et al., 2018).

21st century skills—a broad set of knowledge, skills, work habits, and character traits that focus on preparing students for future success (Fullan & Scott, 2014).

The Six C's of Education—skills and abilities believed to better prepare students for their future which include connectivity, citizenship, communication, critical thinking, collaboration, and creativity (Fullan & Scott, 2014).

Innovative Teaching Practices—practices that deviate from the traditional lecture model and seek to develop high-level skills for students (Le Donné et al., 2016).

Distributed Leadership—leadership practice where leadership is viewed as a product of the interactions of school leaders, followers, and their situations (Spillane, 2005).

School Autonomy—the authority of school leaders to self-govern in relation to the degree of state intervention (Hooge, 1994).

Cognitive Activation—strategies that encourage students to think more deeply in order to find solutions and to focus on the method they use to reach the answer rather than simply focusing on the answer itself (Burge, Lenkeit, & Sizmur, 2015).

Enhanced Activities—practices such as enabling the use of technology in the classroom or offering students opportunities for collaborative work and critical thinking to support the building of cross-curricular skills among students (Le Donné et al., 2016).

Teacher Autonomy—the professional independence of teachers in schools, especially the degree to which they can make autonomous decisions about what they teacher to students and how they teach it (Glossary of Educational Reform, 2014).

Teacher Empowerment—investing in teachers with the right to participate in the determination of school goals and policies and to exercise professional judgement about what and how to teach (Bolin, 1989).

Capacity—the perceived abilities, skills, and expertise of school leaders, teachers, faculties, and staffs (Glossary of Educational Reform, 2013).

Private School—an institution that is not sponsored by government authorities, which serves the individual and the family (James, 1988).

Public School—a free tax-supported school controlled by a local governmental authority (Merriam Webster, 2019).

School Type—a public or private school.

Chapter 2

Review of Literature

Based on the information presented in Chapter 1, I will provide a review of the literature on the key concepts involved in this study including innovative teaching practices, developing 21st-century skills, developing future-ready students, school autonomy, distributed leadership, the school environment, and the barriers to enacting innovation in schools. The chapter will first establish the theory behind the progression towards future-ready students. From there, the key constructs present in the study will be explained to demonstrate their involvement in the process. This will allow the reader to better understand the theoretical relationship between school autonomy and distributed leadership and the frequency with which teachers utilize innovative teaching practices in their classrooms. Chapter 2 concludes with the conceptual framework that guides the study.

Background

The history of education is characterized by new and evolving teaching practices aimed at increasing educational quality (Hermans et al., 2008). While there has been a tremendous number of studies on all different aspects of schooling, teachers have been found to be the most important school factor affecting student outcomes (Le Donné et al., 2016). Teacher quality is not only an important factor for school-level outcomes, but the difference in teacher quality can have significant impacts on a nation's economic growth (Hanushek & Woessmann, 2011). The importance placed on school performance across

the world has deemed it necessary to identify ways in which teacher quality can be improved, thereby increasing student achievement (Le Donné et al., 2016).

Developing a model to identify key areas for improving teacher quality is difficult as there is limited consensus on the definition of an effective teacher (Echazarra et al., 2016). For example, many of the studies on teacher attributes like educational level, certification, and experience have had mixed results when it comes to their impact on student outcomes (Çakir & Bichelmeyer 2016; Goldhaber & Anthony, 2007). Focusing on what the teachers do in the classroom as opposed to their background characteristics can then serve as a more promising area of exploration (Le Donné et al., 2016). Teacher actions such as how they present new information, effective learning environments, and teacher-student relationships could then be considered critical elements for student learning (OECD, 2016).

This concept of practices that are capable of improving student outcomes can be labeled as "instructional quality" (Kunter et al., 2013). The International Summit on the Teaching Profession (ISTAP) (2016) identified the need to focus on instructional quality not only as a means of student achievement but also for fostering 21st-century competencies (Le Donné et al., 2016). Internationally these practices are going underutilized as results from the Program for International Student Assessment (PISA) 2012 demonstrate that only one-third of students were exposed to teaching practices that could foster 21st-century cognitive skills (Echazarra et al., 2016). Wagner (2012) notes that to foster innovation to enhance these 21st-century cognitive skills, environments that

exhibit strong cultures of teamwork, interdisciplinary problem solving, and empowerment are required.

Innovative Teaching Practices

Innovation as a construct is boundary spanning as it is an area of interest in a multitude of fields, including education, business, and psychology. Finding different, more effective ways to do daily tasks is appealing in and of itself. While a general definition of innovation is the development and use of new ideas, behaviors, or practices (Daft & Becker, 1978), there are schools of thought surrounding theories of change that address innovation from a single-dimensional perspective such as professional development or an innovative strategy (Rikkerink, Verbeeten, Simons, & Ritzen, 2016). These single-dimensional theories fail to consider the complexity of the innovation process (Rikkerink et al., 2016). A more thorough understanding of teaching practices is critical because there is more to innovation in education than one program or professional development opportunity. “Innovation is how we initiate movement beyond the status quo” (McLeod & Shareski, 2018, p. 31). With these definitions in mind, for this study, innovative teaching practices is defined as practices that deviate from the traditional lecture model and seek to develop high-level skills for students (Le Donné et al., 2016).

There are two broad types of instructional practices. The first type includes traditional or transmission practices where the emphasis is on the instructor, and much of the learning is provided through lectures, practice, and repetition. The other type of instruction falls in the student-centered approach, where the focus of the instruction lies within developing the students’ analytical and critical thought process, reasoning, self-

inquiry, peer-collaboration, and problem-solving (Echazarra et al., 2016). Each of these sets of practices is associated with different learning tasks. The traditional model of transmission is more related to learning tasks that require repetition, whereas, the student-centered approach is utilized more with tasks that require students to demonstrate higher-order thinking skills and collaboration (Echazarra et al., 2016).

As mentioned previously, Echazarra et al. (2016) pointed out that only a third of students from the PISA (2012) survey were exposed to teaching practices that could foster 21st-century cognitive skills. Due to the generation of the TALIS-PISA link, the alignment of these skills is the same in both surveys. This is a striking result as the use of cognitive activation practices, which stimulate student critical thinking and problem-solving, are associated with higher mathematics performance (Le Donné et al., 2016). Similarly, OECD and colleagues (2014) found that the teaching practice of having students work in small groups to come up with an agreed upon solution to a problem resulted in an increase across school-levels in math and reading scores. McLeod and Shareski (2018) attribute this underutilization to "teachers' and administrators' relentless efforts to control young people in every aspect of their school lives (which) exact(s) a terrible toll on students' willingness to think outside of the box" (p. 27). The authors explain that when teachers employ a transmission model of instruction and place such a high value on compliance, it is extremely difficult to prepare high-level thinkers in these low-level knowledge environments. In his book, Wagner (2012) notes that the way most academic content is taught can be stultifying to students as it is often a process of

transferring information through rote memorization. This model allows for few opportunities for students to ask questions or discover things on their own.

Developing 21st Century Skills

One outcome of the use of innovative teaching practices in the development of 21st-century skills in students (Anugerahwati, 2019). These 21st-century skills can be defined as a broad set of knowledge, skills, work habits, and character traits that focus on preparing students for future success (Fullan & Scott, 2014). These skills are holistic and are made up of knowledge, skills, and attitudes that will enable students to thrive as global actors in the future (OECD, 2019). Fullan and Scott's (2014) Six C's of education act as a framework for the specific skills thought to comprise 21st-century skills. These skills include connectivity, citizenship, communication, critical thinking, collaboration, and creativity (Fullan & Scott, 2014). Connectivity refers to the skill of being able to work beyond the immediate environment students are involved in and acting as a global citizen (Anugerahwati, 2019). Similar to the skill of connectivity is the skill of citizenship. According to Fullan and Scott (2014), citizenship as a skill allows students to be in touch with the world around them while appreciating their own history as a society. Communication is the skill of being able to put forward ideas in a clear and meaningful way. Communication is unique in that it can be developed through four main components, to: inform, instruct, persuade, and motivate (Miller, 2015). The skill allows the student to communicate information in a clear, concise, correct, and coherent way for their audience (Anugerahwati, 2019). Critical thinking as a skill allows students to filter,

question, and analyze information from various outlets and synthesize it to fit their understanding (Anugerahwati, 2019).

Collaboration refers to how students work together to utilize their talents and knowledge to produce something new or solve a problem (Anugerahwati, 2019). The final C, creativity, as a skill, allows students to utilize their own knowledge and talents to create or produce something in a new way (Anugerahwati, 2019). Creativity as a skill enables students to look at existing and future problems and figure out innovative ways to address them (Miller, 2015). Through the advancement of these skills, students are thought to be better prepared for their future. These skills are utilized for this study as they align well with the survey items found in the TALIS (2013) teacher survey.

Much of the curriculum being developed today by educational centers have included the acquisition of skills to discover, evaluate, present, and exchange information (Gil-Flores, Rodriguez-Santero, & Torres-Gordillo, 2017). In his metacognitive study, Hattie and Learning (2009) explained that the teaching practices are multidimensional, and their efficiency depends on the context in which they are applied. This is to say that there is no single teaching strategy that guarantees the improvement of educational outcomes. It is in the combination of techniques and practices that offer the best approach to instructional quality (Hattie & Learning, 2009).

Future-Ready Students

With this premium placed on teaching practices, the practices selected by teachers then need to be well-chosen and align to new realities that emerge over time (Seong, 2019). This means that schools must keep pace with what they are teaching and how they

are teaching it. To prepare students for their future, schools need to be agile and flexible enough to change and adapt (WEF, 2020). Preparing students for their future does not mean that the existing curriculum needs to be removed or condemned. The skills previously mentioned could be incorporated into lessons that have been fundamental for years (WEF, 2020). For example, a familiar lesson may be focused on understanding what lead to the War of 1812. This lesson previously may have been taught through transmission, where the teacher talked about the war, and the students sat passively and read along out of a textbook. Learning is still taking place, but to better equip students to master the tools at their fingertips, and to be successful in their roles in a future society, skills such as collaboration or creativity could be used in complement with technology. The same lesson could be designed to where students work globally through video conferencing to connect with other students or experts to talk about the War of 1812 and gain multiple viewpoints. While developing future-ready students extends well beyond technology, digital tools can help foster the skills necessary (WEF, 2020).

Environmental Influences

Understanding the environment in which these instructional practices do or do not take place is paramount as the organizational environment is critically related to the learning organization's cultural aspects (Cummings, & Worley, 2008). These cultural aspects then support continuous organizational learning, which enhances collaborative creativity among group members. The environment of a school impacts the school's organization, the professional development of the teachers, and the process of innovation within the school (Carpay, 2010). This organizational learning is not done passively but

actively (Supovitz, Sirinides, & May, 2010). Each organization has its own Organizational Learning Culture (OLC), as described by Goh, Cousins, and Elliott (2006). Higher levels of organizational learning are depicted by the ability to transfer knowledge effectively, along with high levels of teamwork and cooperation; clarity and support for the mission and vision; leadership that supports learning; and an experimenting organizational culture.

In their study of organizational learning, Marsick and Watkins (2003) explain that for an organization to integrate new technology or practice, considerable learning may be required at the individual level before the organization develops a new capacity. They continue to explain that "organizational learning is built on the idea that change must occur at every level of learning" (p. 135). This explanation is congruent with the findings of Rikkerink et al. (2016) when they explained that "our conclusion is therefore that we must integrate the concept of 'Leadership Practice' of Spillane et al. (2004) into the Organizational Learning framework" (p. 241). These findings are significant because they demonstrate how leadership as a practice needs to build off of the learning of all of those involved both formally and informally.

To make these changes necessary to developing future-ready students, teachers need autonomy to oppose educational policy related to improvement, which is more focused on technical elements of reform such as program fidelity, rigid curriculum, and prescriptive approaches (Daly, 2009). This level of autonomy is difficult for most teachers to attain, however, as, for the most part, the majority of classroom educators operate within the same innovation-challenged environments as their students (McLeod

& Shareski, 2018). The teachers who do deviate from these mandates are often punished formally by their administrator, or informally by their peers (McLeod & Shareski, 2018).

This punishment from administration or alienation from peers is also harmful to teachers' relationships. Zhao et al. (2002) cite peer relationships as an essential factor in the successful implementations of innovations. In their study of organizational learning, Rikkerink et al. (2016) found that opinions and behaviors of colleagues, such as psychological factors, can have either a positive or negative influence on how they introduce new practices for learning. The authors continued by explaining that "individual learning can only influence others when the personal learning process is demonstrated and explained, and then shared with colleagues" (p. 239). Sharing new and creative ideas and practices can also be a way of teachers and other informal leaders to establish and maintain a "safe" climate that is conducive to innovation (Moolenaar et al., 2010).

In their study of teachers' educational beliefs and the use of information and communication technologies (ICT), Hermans and colleagues (2008) found empirical evidence that demonstrated that teachers' beliefs were a significant determinant in explaining why teachers adopted educational innovations in the classroom. In their stepwise analysis, they also found that teacher's beliefs seemed to be just as important to adoption as teacher characteristics such as computer experience, general computer attitudes, and gender. These findings are significant as they corroborate the findings of Le Donné et al. (2016) that explain that the attitudes of teachers and organizations are critical for fostering innovation in education.

One way to bolster teacher attitudes towards the adoption of innovative educational practices is the level of decision making afforded to teachers. Frank, Zhao, and Borman (2004) found that decision making was a critical component for open orientation towards innovation. Moolenaar et al. (2010) then suggest that a social learning process could undergird the development of organizational innovation. This is to say that different people, knowledge, and resources can trigger the generation of new ideas and practices. This increase in teacher capacity and autonomy in decision making is associated with higher levels of teacher job satisfaction as well as self-efficacy (Echazarra et al., 2016). The authors then point out that future research could explore how this increased capacity and autonomy are associated with the implementation of teaching practices.

School Autonomy and Innovative Teaching Practices

School autonomy refers to the authority of school leaders to self-govern in relation to the degree of state intervention (Hooge, 1994). During the last decades, countries across the world have granted principals higher levels of influence alongside increased accountability (Cheng & Szeto, 2016). From this increase in influence, the decision-making of principals has become even more significant (Imants, Zwart, & Breur, 2016). In their review of literature, Seong et al. (2018) found that "only limited research has examined whether principals feel they have enough influence and authority to effectively lead their schools" (p. 221). This is an intriguing development as a gap then forms between the amount of influence that school principals think they need to be effective leaders and the amount they actually possess (Adamowski, Therriault, &

Cavanna, 2007). In their study of the characteristics associated with distributed leadership (Liu et al., 2018) found the school characteristics such as school type (public or private) was a negative predictor for staffing, budgeting, and instruction. Their findings indicate that private schools have more school autonomy for all three aspects. This is an intriguing result in that it corroborates the public-school principal perception of autonomy findings by Seong et al. (2018).

A better understanding of the pros and cons of school autonomy and which specific forms of school autonomy result in better outcomes for students could then be very beneficial. Neeleman (2019) sought to develop a more comprehensive classification of school autonomy that could be used in international studies. Their research resulted in the development of three domains of leadership autonomy: education, organization, and staff. These components are similar to the TALIS (2013) survey, which divided school autonomy into three categories of budgeting, staffing, and instructional policies. The work of Neeleman (2019) on school autonomy can then be considered beneficial to further understanding school autonomy, as described by TALIS (2013).

Using data from PISA (2000), Fuchs and Woessmann (2007) found that educational systems improve when schools are given higher levels of influence in staffing, budgeting, and instructional practices. They continue by explaining how local decision making can be conducive to student performance by utilizing local knowledge of context. Across the board, the authors found that "school autonomy is mostly beneficial in areas with informational advantages at the local level" (p. 21). In their study of school characteristics and distributed leadership, Liu et al. (2018) found that school autonomy

for staffing was negatively correlated with teachers' perceived distributed leadership. They expand on this finding by pointing out that "when school principals have authority for staffing, it is less likely that the school involves staff, parents, and students in school decision-making" (p. 413).

Similar to teachers, principal attitudes and motivation to implement innovative teaching practices is paramount to success (Le Donné et al., 2016). The authors elaborate on this premise by explaining that the school leader's decision to be involved and develop the professional networks which allow teachers to share ideas and collaborate has to be intentional. In their study of conditions for classroom innovation, Zhao et al. (2002) examined the conditions that best supported the use of innovative teaching practices in classrooms. In several cases, school autonomy was found to be the key element to the success or failure of the implementation. The authors point out, "although the use of innovation appears self-contained in that it only involved their classrooms, it required the support and cooperation of the principal" (p. 500).

An example of the impact the support of the school can have was exemplified in a study by González-Falcón and colleagues (2019). In their study of the importance of principal leadership for school success, González-Falcón et al. examined two schools that were drastically different in their socioeconomic index. The authors found that the principal of school (B), though coming from the more economically disadvantaged school, had greater student success than the principal of school (A) who worked at the more economically privileged school. The authors attribute this difference in results to the contrasting leadership style of the principals. The principal of school (A) was more

focused on the stability of the school instead of the influence of the informal stakeholders. This was in glaring contrast to the principal of school (B) who made it a priority to work alongside families and students and follow a model of distributed leadership with her teachers (González-Falcón et al., 2019).

Leadership's Role in Innovative Teaching Practices

Moolenaar et al. (2010) explained that principals are under increased pressure to utilize innovative teaching practices as a way to bolster student achievement. Leadership can promote the use of these practices by motivating teachers and developing a supportive atmosphere for the development of teachers' innovative skills, which in turn leads to the enhance the innovative capacity of the entire school (Li, Shang, Liu, & Xi, 2014).

In their study of transformational leadership and innovative school climate, Moolenaar et al. (2010) found that leaders who nurture and stimulate teachers can support a school environment in which more teachers are oriented towards innovation and challenge the status quo. These leadership practices then develop a school climate that allows teachers to take risks and develop shared visions and goals. By not only allowing teachers to challenge the status quo but outright supporting it, many leaders are opposing educational policies related to improvement, which is more focused on technical elements of reform such as program fidelity, rigid curriculum, and prescriptive approaches (Daly, 2009). The literature on the role of school leaderships' effects on student learning stretches back at least 50 years (Supovitz et al., 2010).

The literature on this relationship between school leadership and student outcomes emphasizes the critical indirect influence the principal has on student achievement (Hallinger & Heck, 1996; Leithwood et al., 2007; Witziers, Bosker, & Krüger, 2003). This indirect influence is expressed through the numerous responsibilities for keeping schools running and improving school outcomes (Sebastian, Huang, & Allensworth, 2017). In their study, Sebastian and colleagues (2017) explain that principals influence student learning through many paths. Some have a stronger relationship with student achievement than others, which "suggests that the specific mechanisms through which leaders try to influence learning matter considerably" (p. 90). This is a fundamental distinction when it comes to the decision-making of principals. As principals and schools gain increased levels of influence, the impacts of their decision-making have also increased (Neeleman, 2019).

Principals also play a vital role in the use of innovative teaching practices; not only do they need to be on board with the implementation (Le Donné et al., 2016), they also play a central role in "effectively supporting teachers in building and sustaining a healthy school climate where teachers are encouraged to continuously grow as reflective and innovative practitioners" (Ham & Kim, 2015, p. 60). Therefore a leader's ability to enhance the use of innovative teaching practices in their school requires them to bring together the knowledge, expertise, and skills of others in a "safe" environment (Storey, Salaman, & Platman, 2005) where teachers have the opportunity to collaborate and test out creative ideas (Mumford, Scott, Gaddis, & Strange, 2002). Mulford and Silins (2011) expound that for principals to be effective in improving their schools, they need to

develop synergy and develop a shared direction over time. This development requires school autonomy to make decisions that fit the culture and context of the school (Keddie, 2016).

Through this synergy and shared direction, the leader can develop capacity for professional learning among teachers. Ni, Yan, and Pounder (2018) found that "principals can significantly influence school performance through setting directions for schools, building professional capacity for teachers, and managing school organizations to provide safe and orderly environments that foster school improvement" (p. 221). For principals to take this capacity-building a step further and enhance the use of innovative teaching practices, there must be a combination of speed, ease, opportunities to interact, and consistency of shared resources (Moolenaar et al., 2010). The principal can also develop the practice of how knowledge is shared as a way to foster the use of innovative teaching practices and creativity within their school (Ritala, Olander, Michailova, & Husted, 2015). Teachers must also feel as though they are in a safe environment where they can take risks and know that they are allowed to fail without professional repercussions (McCharen et al., 2011). To do so, schools need a high level of autonomy to be able to make decisions that benefit their specific schools (Fuchs & Woessmann, 2007).

Distributed Leadership and Innovative Teaching Practices

Historically the role of advancing a school's instructional capacity has been the responsibility of the principal. However, this responsibility was seen as simply too complicated and overwhelming of a job for a single leader due to the myriad of issues that command a school leaders' time (Klar, 2012). Given this, research on school

leadership posits that school leaders should be encouraged to adopt a more inclusive view of instructional leadership where leadership is distributed and understood as a shared activity between multiple stakeholders (Harris, Leighwood, Day, Sammons, & Hopkins, 2007).

The term distributed leadership gathered momentum in the early 2000s for its capacity to involve both formal and informal stakeholders (Spillane, 2006). The work of Spillane, Halverson, and Diamond (2001) has served as the cornerstone of contemporary distributed leadership theory (Harris & DeFlaminis, 2016). Research has highlighted the positive influence of this leadership model on organizational conditions (Hallinger, 2011) and student achievement (Gumus, Bellibas, Esen, & Gumus, 2018; Louis et al., 2010). Distributed leadership reflects an effort to reconceptualize leadership in schools by exploring how leadership is "stretched" over the practice of two or more leaders (Spillane, 2006). This stretching of leadership increases the number of stakeholders, viewpoints involved in the decision-making process, as well as provides opportunities for principals to develop the instructional capacity of teachers (Harris, 2009; Klar, 2012; Leithwood et al., 2004). These teachers can then serve as a nexus for the principal and other staff members to communicate ideas and interactions (Firestone & Martinez, 2007).

Much of the research done on distributed leadership focused on the testimonies of those in the formal leadership role and not those in the non-traditional leadership roles. This top-down approach leaves out key perspectives that may differ throughout an organization (Bolden, 2011). Harris (2004) asserted that the key to successful distributed leadership resides in relying on teachers with experience in collectively guiding and

shaping instructional and institutional development. Ni et al. (2018) expressed the need for teacher input by stating, “since teachers are the center of the ‘technical core’ of teaching and learning” (p. 144). This focus on teachers was supported by the case studies work described by Anderson (2012), suggesting that a collaborative approach to leadership was the most effective when trying to implement change.

A study of teachers in six urban schools also documented the importance of principal voice for impacting change. Johnson et al. (2014) note that principals are essential to making teachers’ involvement possible and shaping the nature of their efforts towards school improvement. Sebastian et al. (2017) continue with this frame of thought by explaining, “while many aspects of teacher leadership or distributed leadership in school personnel can develop organically, at least some of it results from the direct leadership efforts of principals” (p. 72).

Groundings in activity theory. Distributed leadership draws upon distributed cognition and activity theory to develop distributed leadership practices (Harris et al., 2007). Spillane utilized activity theory to propose that the leadership practice is constituted in the interactions of school leaders, followers, and situations (Ho, Chen, & Ng, 2016). Figure 3 illustrates Activity Theory by outlining the interactions of school leaders, followers, and situations (Spillane et al., 2001).

Activity Theory focuses on the division of labor between formal and informal leaders, as well as outcomes. These foci then map well onto the distributed leadership framework (Ho et al., 2016). The unit of analysis in Activity Theory is the collective

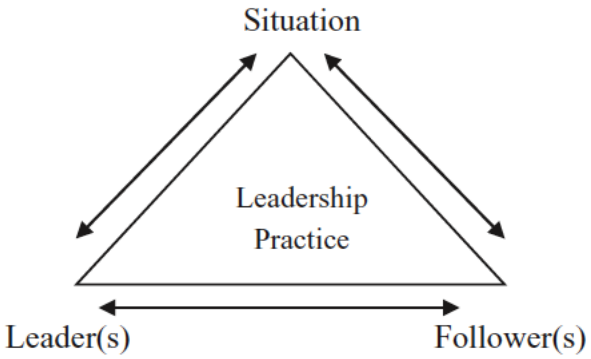


Figure 3. Distributed leadership through activity theory (Spillane, Halverson, & Diamond, 2004).

activity itself, which lies within its community-based context (Collis & Margaryan, 2004). The subjects of Activity Theory are the individuals or groups involved in the activity who are motivated to develop the activity into an outcome (Marken, 2006). In their study of distributed leadership and Activity Theory, Ho et al. (2016) explain why the use of Activity Theory can benefit researchers interested in studying distributed leadership as it assumes that leaders are involved at different levels yet work interdependently. The different activity systems then impact the way leadership is distributed and performed. Activity Theory then has the potential to allow researchers to bring together literature on generally separate literature on leadership by principals and teachers, who may operate in different activity systems within the school (Ho et al., 2016). Their findings also demonstrate the importance of context due to Activity Theories' focus on the social-cultural aspect of leadership.

Empowerment for decision-making. One component of distributed leadership is the empowerment of decision-making. The loss of empowerment is seen as the hallmark of de-professionalization, where educators lose influence and power to define their work (Frostenson, 2015). Empowerment here refers to the educators having the decision-making power to make their choice of materials, pedagogy, and influence over systems (Frostenson, 2015). Sebastian et al. (2017) found that empowering teachers to wield greater influence over school policy and matters concerning the school learning climate to be the most effective strategy for improved student outcomes. The authors continue by pointing out that teacher leadership and principal leadership are not mutually exclusive, in that principal leadership influences teacher influence. According to McLeod and Shareski (2018),

> school administrators must build cultures of innovation by giving up some of their decision-making authority as well as developing some trust in their teachers. . . . Our factory-model schools will continue to disengage both students and teachers until we make schools different. (p. 33)

Empowering educators allows them to make decisions that they believe will better serve their students (Webb, 2002). When educators then have the ability to make context-related decisions, they can look for new ways to prepare their students for their future. Empowerment can then foster an environment for innovation to occur (Kimwarey et al., 2014). Innovation also requires teachers and principals desire to initiate (Le Donné et al., 2016). When educators are granted the ability to make significant school decisions, motivation, and job satisfaction improve (Zhao et al., 2002).

Distributed leadership developing capacity. As educators become more empowered, they also need to have the capacity to make informed decisions (Caldwell,

2016). Mitchell and Sackney (2006) posit that distributed leadership is at the core of the capacity building model. As education continues to shift to a context focused on accountability, the roles principals and teachers have to fill has become increasingly complex, and requires increased knowledge, skill, and capacity (Fusarelli, Kowalski, & Petersen, 2011). The capacity to impact students is not only found at the teacher-level, but it also comes from school leaders as well. “Strong leadership practices are intended to affect school processes that mediate the effects of leadership on student achievement” (Sebastien & Allensworth, 2012, p. 628). One of these processes, as described by Bryk, Sebring, Allensworth, Luppescu, and Easton (2010), included the professional capacity of staff. Byrk et al. (2010) found that significant differences in test scores existed when school leaders focused on the development of school capacity. One of the core components of distributed leadership is the ability to enhance the collective capacity of a school through the development of individual capacities (Yukl, 2002). In this way, principals influence school performance by building the capacity of their teachers (Ni et al., 2018). Gold, Evans, Early, Halpin, and Collabone (2002) also point out that distributed leadership can benefit leadership development. As the school-wide capacity building is developed, the sustainability of school improvement increases (Harris et al., 2007). This sustainability is critical for innovative teaching not only to be implemented but supported continuously.

In their study of school innovation, McCharen et al., (2011) explain that “continuous learning, inquiry, and dialogue, dynamic team-based learning, empowerment, system connection, embedded systems, and strategic leadership”

contribute to the development of organizational capacity and fostering of innovative work processes (p. 680). Along with this line of school capacity, Bryk et al. (2010) identified the involvement of parents and the community as a critical component in developing school capacity. This framing maps well onto distributed leadership theory as the inclusion of all formal and informal stakeholders is beneficial for the overall learning of the system (Spillane et al., 2001).

Increased school autonomy can also build capacity in schools (Caldwell, 2016). OECD et al., (2013) points out that school autonomy related to curriculum, assessments, and resource allocation tends to be associated with increased school performance. This alignment is important as the data set used for this study is divided into the same components of school autonomy. This will allow for a more coherent comparison. Increased school autonomy helps develop capacity through the motivation of educators to try and master new tasks, as well as taking on larger roles in their organization (Frese & Fay, 2001). Teacher and principal motivation have been noted as key components of innovation (Le Donné et al., 2016). With this motivation, the work of Echazarra et al. (2016) surmises that the key components of innovation come from autonomy, empowerment, and capacity. As school autonomy and distributed leadership increase, so does educator empowerment and capacity.

Barriers to Innovative Teaching Practices

In the previous sections, I have outlined the ways in the key components of the study and their relations with innovative teaching practices. However, there are five identified barriers to implementing these practices in classrooms: context, training,

attitudes, communication, and a disconnect in the development of a shared vision. Context acts as a major impediment in that individual differences and needs exist between settings. As explained by Shavinina (2013), the individual differences make it so that there is no one best way to foster innovation. Something that works well for one organization may not be as successful somewhere else.

Shavinina (2013) identifies three major categories of barriers to innovation: human-related, technology-related, and policy-related barriers. She explains that a multitude of these obstacles inhibit the potential for innovations to be implemented in practice. She refers to this difficulty in instituting innovations as the "innovation gap." An innovation gap implies that people have a lot of creative ideas, but they are unable to implement them due to one of these three major categories of barriers.

In their study, Gil-Flores et al. (2017) identify lack of infrastructure, resistance to change, ineffectiveness in teacher training, and lack of support staff as just a few of several barriers to the integration of new programs of innovative teaching practices. Each of these barriers falls into one of the major categories, as described by Shavinina (2013). The authors cite Hall and Hord's (2015) Concerns-Based Adoption Model, which states people respond to new programs or innovation in accordance with their attitudes and beliefs. This model is substantiated in the findings presented by Gil-Flores et al. (2017), which establish that infrastructure represents a necessary but not a sufficient condition for innovative integration. The authors found that teacher characteristics were more relevant to the use of innovative teaching practices than the availability of infrastructure. These findings, combined with the previously mentioned studies conducted by Hermans et al.

(2008) and Le Donné and colleagues (2016), confirm the concept that teacher attitudes can serve as a catalyst or barrier to fostering innovation in education.

A problem exists in the communication between administrators and policymakers and their teachers. The problem is that the interactions are mostly one-way. Policymakers and administrators "often command, dictate, and direct individuals whom they expect to carry out their innovation agendas, it's much rarer that they listen to, empower, or self-actualize these educators" (McLeod & Shareski, 2018, p. 32). This removal of the teacher's voice perpetuates a "crab bucket culture" where those brave enough to take a risk are often criticized by their peers (Margolis, 2012).

Previous educational reforms have failed, due to the mismatch between the meaning attached to the innovation by those involved in the instructional process (van den Berg, Vandenberghe, & Sleegers, 1999). In other words, previous reforms have failed because there was a disconnect between the ones developing the innovation and the ones implementing it. This mismatching has continued on since van den Berg et al. (1999) as the No Child Left Behind act was enacted in (2002) and demonstrated a clear disconnect between policy makers and practitioners (Evans & Hornberger, 2005). A lack of shared vision can be a substantial barrier to the adoption or fostering of innovative teaching practices (Moolenaar et al., 2010). Communication, especially between teachers and staff at levels in the school, is also critical to reform and restructuring (Collison & Cook, 2001). Creating a school culture that fosters innovation "requires instructional leaders to develop a shared vision that is clearly communicated to faculty and staff. Additionally, leaders must create a climate that encourages shared authority and

responsibility" (McCharen et al., 2011, p. 688). McCharen and colleagues (2011) continue to explain that leadership development should focus on developing organizational understanding and how it can positively support teacher autonomy, creativity, and knowledge creation, which are critical components of innovation.

Conceptual Framework

In this section, I will contextualize and conceptualize the study of the relationship between distributed leadership school autonomy and teachers' use of innovative teaching practices. This conceptual framework outlines the design of the study to answer the two research questions.

There is an agreed-upon process that, through the use of innovative teaching practices, educators can develop 21st-century skills in their students, which in turn will help prepare them for their future (McLeod & Shareski, 2018). The primary aim of this study is to understand how school autonomy and distributed leadership impacts the initial step in this process: teachers' use of innovative instructional practices. When educators are given more influence through school autonomy and distributed leadership it allows them to make contextually based decisions. Both of these constructs demonstrate the importance of both the principal and the teacher in the process of preparing students for their future.

The importance of school autonomy and distributed leadership is significant for several reasons. First, school autonomy on decision-making acts as a precursor to the work of empowering teachers because both teachers and principals have to be amenable to the change (Le Donné et al., 2016). Though principal influence on students is indirect,

schools can have a direct influence on teachers. What is unknown is if this direct influence impacts desirable teaching outcomes. When schools have more influence over staffing, budgeting, and instructional policies, are they better able to transfer this influence to their teachers? Do school districts where the decision-making is heavily centralized, and schools are limited in their amount of autonomy, limit teacher's use of innovative teaching practices?

Second, understanding distributed leadership's role in specific teacher activities is imperative. If we believe that teachers need autonomy and capacity to institute innovative teaching practices that are better designed to educate students for the 21st century, then knowing the extent to which this closely aligned leadership philosophy does this is essential. This step will then better allow us to understand how to link this philosophy to student outcomes in future research.

This conceptual framework, depicted in Figure 4, explains the context for this study. The unit of analysis is the teacher reported the amount of use of each innovative teaching practice. The use of innovative teaching practices was separated into two measures "cognitive activation" and "enhanced activities," as described by TALIS (2013). School autonomy and distributed leadership are above as school-level constructs and show their relationship down onto the overall image of teachers' use of innovative teaching practices.

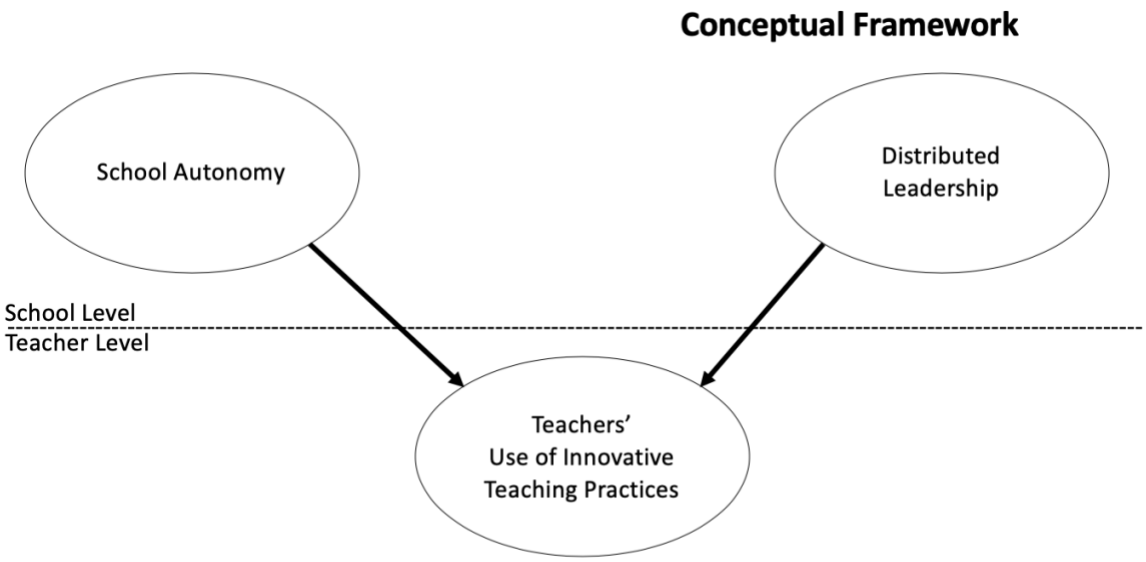


Figure 4. Conceptual framework for the study.

Chapter 3

Methods

To answer the two research questions: To what extent is distributed leadership related to teachers' use of innovative teaching practice? To what extent is school autonomy in staffing, budgeting, and instructional policies related to teachers' use of innovative teaching practice? A multilevel structural equation model to gain both principal and teacher-level responses utilizing secondary data was applied. The public data was downloaded from the OECD website. All data preparation work was done in SPSS 23, and Mplus (8.0) was used for analysis. In this section, I will introduce the data source, samples, measures and variables, and analysis procedures utilized in this study.

Data Source and Sample

The data for this study comes from the 2013 Teaching and Learning International Survey (TALIS, 2013). This data set was selected because it contains measures of the key components of this study: school autonomy, distributed leadership, and innovative teaching practices. The data set was also chosen as it nests teachers within schools. This allows for responses from teachers and principals that come from the same school to be kept together. A final reason for the selection of this data set lies in its international reliability. The TALIS (2013) data were collected by the Organization for Economic Cooperation and Development (OECD) from 34 participating countries and economies. In each country, the OECD sampled about 200 schools and about 20 teachers in each school. TALIS (2013) followed the International Standard Classification of Education (ISCED, 1997) to clarify the levels of education it examined: ISCED level 1 was a

primary school, ISCED level 2 was a lower secondary school, and ISCED level 3 was an upper secondary school. The target population for the main study of TALIS (2013) was ISCED level 2 teachers (e.g., middle school teachers in the United States). The achieved samples included 7,436 lower secondary schools and 117,876 teachers. Since the OECD used probability sampling, the samples represented about 234,572 lower secondary schools and 4,623,321 teachers internationally. This significant sample allows for multiple viewpoints, school types, and settings to be analyzed.

The large sample in the TALIS (2013) data set by itself does not consider other variables required to make the data reflect the entire population and not just those schools and teachers sampled. Through the use of school-level weights and teacher-level weights, the majority of the necessary adjustment factors can be accounted. The school and teacher weights included in the TALIS (2013) survey serve as a way to avoid estimation biases. For example, at the school-level larger schools are more likely to be selected due to the random sampling design. At the teacher-level in some schools and contexts, principals are also required to teach, or one teacher may work at multiple schools. These types of factors are accounted for by including the school-level and teacher-level weights in the analysis.

Measurement invariance was explicitly tested for the use of international comparative studies. Measurement invariance means that for items to be selected, they must show that they are answered similarly across different educational locations. This means that if an item does not test similarly across countries, then it will not be included in the final TALIS (2013) results. This is critical to the analysis because the sample used

for this study is made up of school systems that can be incredibly different from one another. Further information on this process can be found in the TALIS (2013) Technical Report on page 150. TALIS (2013) survey used two questionnaires to collect data: a principal questionnaire that was completed by those identified as school leaders and a teacher questionnaire completed by the sampled teachers. The surveys are filled in on paper or online.

Dependent Variables

TALIS (2013) examined teachers' self-reports of how often they utilized specific instructional practices in their classroom teaching. These practices were grouped into four categories within the survey: (a) classroom management; (b) clarity of instruction; (c) cognitive activation; and (d) enhanced practices. Cognitive activation and enhanced practices specifically were employed to shed light on the use of innovation in classrooms as they emphasize the building of cross-curricular skills among students. The use of these practices is relatively new in the context of 21st-century education and, therefore, requires that teachers reinvent and shape their approaches to teaching appropriately (Le Donné et al., 2016).

Cognitive activation according to OECD. Cognitive activation is characterized by tasks that: require students to think critically, ask students to decide on their procedures for solving complex tasks, or present tasks for which there is no obvious solution. Items for both outcome variables were measured with a four-point Likert scale asking teachers to describe how often each strategy was utilized throughout the school year, where the responses were: 1 = never or almost never; 2 = occasionally;

3 = frequently; and 4 = in all or nearly all lessons. Items describing cognitive activation include: “I present a summary of recently learned content;” “I give different work to students with difficulties or those who advance fast;” “I refer to a problem from everyday life or work;” “I let students evaluate their own progress;” and “I observe students when working and provide immediate feedback.”

Enhanced activities according to OECD. Enhanced activities are described as tasks that allow students to use technology for projects of classwork, enable students to work in small groups to come up with a joint solution to a problem, or give students projects that require at least one week to complete. Items describing enhanced activities include: “students work in small groups to come up with a joint solution to a problem;” “students work on projects that require at least one week to complete;” and “students use ICT for projects or classwork.”

Independent Variables

The independent variables used for this study were separated into two categories: predicting variables and control variables. The predicting variables, school autonomy and distributed leadership, were used as the focus of the study. These variables are central to the research questions and help the researcher understand the level of distribution within a school as well as the amount of autonomy the school has. The control variables were used to analyze the amount of variance they account for. This was done to better understand the impact of the predicting variables on the dependent variables use of cognitive activation and enhanced activities.

School autonomy. School autonomy items were measured from the principal perspective. School autonomy indices were created using nine statements, each of which had five response options. Principals were asked which entity had the significant responsibility of each of the nine tasks. Descriptions of the entities were worded as: "you, as principal;" "other members of the school management team;" "teachers (not as part of the school management team);" "school governing board;" and "local municipality/regional, state, or national/federal authority." Three indices were formed from the items: school autonomy for staffing, school autonomy for budgeting, and school autonomy for instructional policies.

School autonomy for staffing was measured by two items worded as "appointing or hiring teachers" and "dismissing or suspending teachers from employment." School autonomy for budgeting was measured by three items worded as "establishing teachers' starting salaries, including setting pay scales," "determining teachers' salary increases," and "deciding on budget allocation within the school." School autonomy for instructional policies was measured by four items worded as "establishing student disciplinary policies and procedures," "establishing student assessment policies, including national/regional assessments," "determining course content, including national/federal curricula," and "deciding which courses are offered."

Indices for the items were developed by computing the principal responses and categorizing the items as the responsibility of the principal (autonomous) or an external responsibility (not autonomous). If a principal selected from both lists, then the responsibility was considered shared or (mixed autonomous). Responses were then coded

for each scale as 1 for “no autonomy,” 2 for “mixed autonomy,” and 3 for “autonomy.” Based on the TALIS technical report (2014), the reliability coefficient for each of the school autonomy variables were: school autonomy for staffing 0.68, school autonomy for budgeting 0.58, school autonomy for instructional policies 0.65. For participating countries, for each of the school autonomy variables the International Standard Classification of Education (ISCED) level 2 was used. ISCED level 2 means that the principals and teachers are working with students typically ages 10-13. In this study, I used the items mentioned above to measure school autonomy.

Distributed leadership. The TALIS (2013) teacher data measured the degree of distributed leadership used three items to measure “participation among stakeholders.” All items were measured with a four-point Likert scale, where the responses were: 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. Based on the TALIS technical report (2014), the reliability coefficient for the scale was above 0.70 for participating countries, and the overall international reliability was $\alpha = 0.853$ for the ISCED level 2. This shows good reliability, as an alpha level above 0.70 is acceptable (Kline, 2000). The Confirmatory Factor Analysis (CFA) model revealed a good fit for all countries. The scale also presented good cross-country invariance. In this study, I used the three items mentioned above to measure distributed leadership.

Control Variables

For this study, control variables were selected from both the teacher and principal surveys. Items used from the teacher survey include gender, level of education, number of years as a teacher, professional development needs in ICT skills for teaching, and need

for professional development in new technologies in the workplace. Items used from the principal survey include gender, level of education, number of years as a principal, school type (public or private), school size, and percentage of students coming from a disadvantaged home. Controlling for these variables will allow the researcher to analyze the amount of variance they account for compared to the predicting variables. Guided by relevant literature, these variables were selected specifically for their hypothesized impact on the outcome variables. For example, Guramatunhu-Mudiwa and Bolt (2012) found that teachers in North Carolina perceived that female principals outperformed their male counterparts in instructional and administrative roles. This difference in perception based on the gender of the principal could then be controlled for as a background variable.

Similarly, Dhuey and Smith (2014) studied whether a principal's degree level affected student performance. They found that having an advanced degree did offer some benefits for student reading scores, but that not having a doctoral degree improved math scores. Branch, Hanushek, and Rivkin (2012) found that schools with a higher percentage of low socio-economic status students are connected with lower levels of achievement. School size is one of the least clearly defined impacts in the literature with varying understandings about its influence on students (Masci, De Witte, & Agasisti, 2018). When addressing the school type, Bloom, Lemos, Sadun, and Van Reenen (2015) found that private schools outperformed their public counterparts in reading scores in their multilevel study of Programme for International Student Assessment (PISA) study.

Professional development needs in ICT skills for teaching and the need for professional development in new technologies in the workplace are hypothesized by the researcher to be salient items in the study. It is understandable that if a teacher feels confident in their use of ICT for teaching that they would then be more likely to utilize innovative teaching practices centered around ICT use. Conversely, if a teacher feels as though they have a strong need for professional development in the area of ICT for instruction and/or the development in new technologies in the workplace, then it is reasonable to assume that they would be less likely to utilize innovative teaching practices centered around ICT use.

Statistical Analysis Procedures

For this study, Multilevel Structural Equation Modeling (MSEM) was used to combine multilevel modeling's (MLM) ability to analyze information from multiple school-levels and structural equation modeling's (SEM) ability to analyze latent constructs. To understand the relationship between school autonomy distributed leadership and the effects they have on teachers' use of innovative teaching practices, each topic has been operationalized as a latent construct. This is beneficial for this type of study because it allows data collected from two distinct levels (teacher and school) to be analyzed at the appropriate level and account for the hierarchal nature of schools. This attention to individual perception is vital because other statistical models, such as structural equation modeling, force lower-level responses to be aggregated to the highest level of the analysis, in this case, the school-level. This aggregation can ignore some of the information gleaned from the individual level. In their article, Urick and Bowers

(2011) are perhaps the harshest critics of this aggregation of data across levels. By avoiding aggregating all of the data to the highest level, teacher responses are able to be nested within their schools. This means that teacher responses are aligned with their own principals' response as opposed to all principal responses. To avoid this aggregation, the use of MSEM can be used to analyze both the principal and teacher responses. Prior to the analysis aimed at answering the research questions, a descriptive analysis was run to gain a better understanding of how the survey items were answered. In the following sections I will describe the latent construct development, the procedure for research question 1 and the procedure for research question 2.

Latent construct development. After downloading the data set from the OECD site, the data was prepared in SPSS. Data preparation included combining the principal and teacher data sets, reviewing the data for inconsistencies, and renaming variables. The data set was then transferred to Mplus (8.0) for the analysis.

When developing multilevel latent constructs, it is important to understand and conceptually identify which type will be most appropriate for the study. Stapleton, Yang, and Hancock (2016) described two types of constructs that exist at level 2, in this case the school-level, they are configural and shared constructs. Configural constructs are cluster aggregates of the measurement of characteristics of individuals who comprise a cluster. A shared construct conversely, allows the factor loadings to be freely estimated and does not have a measurement model at the individual level (Stapleton et al., 2016). A shared cluster construct is one that is assumed to be the same for all individuals in a given cluster (Stapleton & Johnson, 2019). In their article Stapleton and Johnson (2019) give

the example of safety within a neighborhood. Each person living in that neighborhood has been exposed to the same stimulus and then they could act as multiple raters of the same stimulus. The main difference between the shared cluster construct and the configural cluster construct are that the factor loadings of the configural cluster constructs for the same indicators are held equal across levels.

An example of an appropriate time to utilize a configural cluster construct would be a measure of instructional quality, a characteristic of the classroom, and not of the individual student. Responses to items from students in the same classroom should be highly correlated; in fact, they should be seen as interchangeable. Any variability and covariation of responses at the within-cluster level are not of interest in this model. Minimal variability should be found at the within-cluster level for a truly configural cluster construct (Stapleton et al., 2016).

To use items to develop these types of constructs requires estimates of an individual item's Intraclass Correlation 1 and 2 coefficients. ICC (1) are measures used to justify the use of multilevel modeling. Acceptable values for ICC (1) are values greater than 0.05. In this case, teacher-level items above 0.05 would merit the use of multilevel modeling. Next, to justify as a shared cluster construct, the ICC (2) requires a value greater than 0.7. Shrout and Fleiss (1979) refer to ICC (2) as a measure of reliability of cluster components. Stapleton et al. (2016) cite the work of Raudenbush and Bryk (2002) and explain that ICC (2) is, "estimated where $\eta_{.}$ is the average cluster size for an estimate of average reliability over all clusters or where $\eta_{.}$ is η_j to obtain a reliability estimate for a given cluster *j"* (p. 486).

$$\mathrm{ICC}(2) = \frac{\sigma^2_{\eta_B}}{\sigma^2_{\eta_B} + \frac{\sigma^2_{\eta_W}}{n.}},$$

Figure 5 presents the configural construct model designed by Stapleton et al. (2016) that was used as the model for the multilevel latent constructs in this study

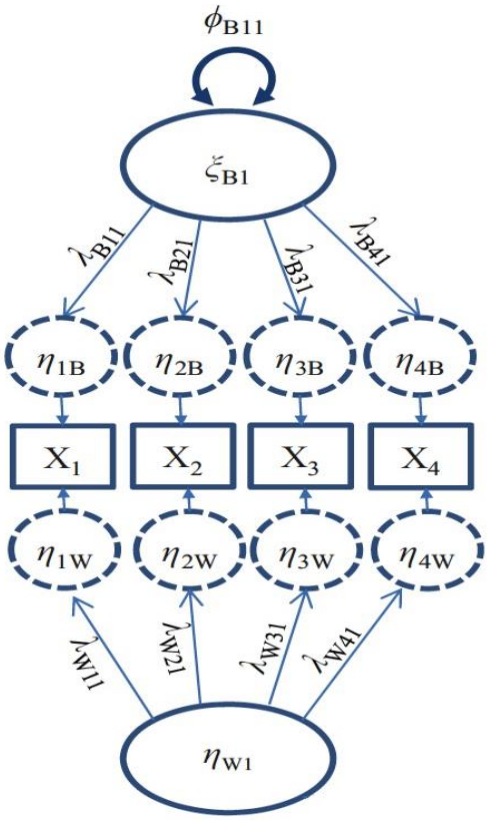


Figure 5. Configural cluster construct (Stapleton et al., 2016).

Three latent constructs (distributed leadership, cognitive activation, and enhanced activities) were first developed at the teacher and school-level. This was accomplished by taking the results of the specific survey items and combining them together as one construct. The first latent construct developed was distributed leadership. Distributed

leadership as a construct was measured by five items from the teacher survey, including parent staff participation in decision-making (TT2G44A), parent participation in decision-making (TT2G44B), student participation in decision-making (TT2G44C), sense of shared responsibilities (TT2G44D), and a collaborative school culture (TT2G44E). Though distributed leadership is measured from the teacher-level, distributed leadership can be understood as a school-level construct as it focuses on the involvement of stakeholders throughout the school.

Conceptually, distributed leadership can be thought of as a shared cluster construct as we would assume that teachers in the same school, like people living in the same neighborhood, are exposed to the same stimulus and then could act as multiple raters of that same stimulus. However, in their article Stapleton and Johnson (2019) encourage applied researchers to avoid models without constraints across levels because the freely estimated factor loadings assume that the average amount of the individual-level construct in a cluster does not differ then across clusters. Considering this information, distributed leadership was then developed as a configural cluster construct where the factor loadings were constrained across levels see Figure 6.

The process for developing the other two latent variables (cognitive activation and enhanced activities) was the same as the construction of distributed leadership as they were also developed as configural cluster constructs. For the latent variables, cognitive activation, and enhanced activities, items were taken from the teacher survey. Cognitive activation was measured from the teacher survey items: how often do students get

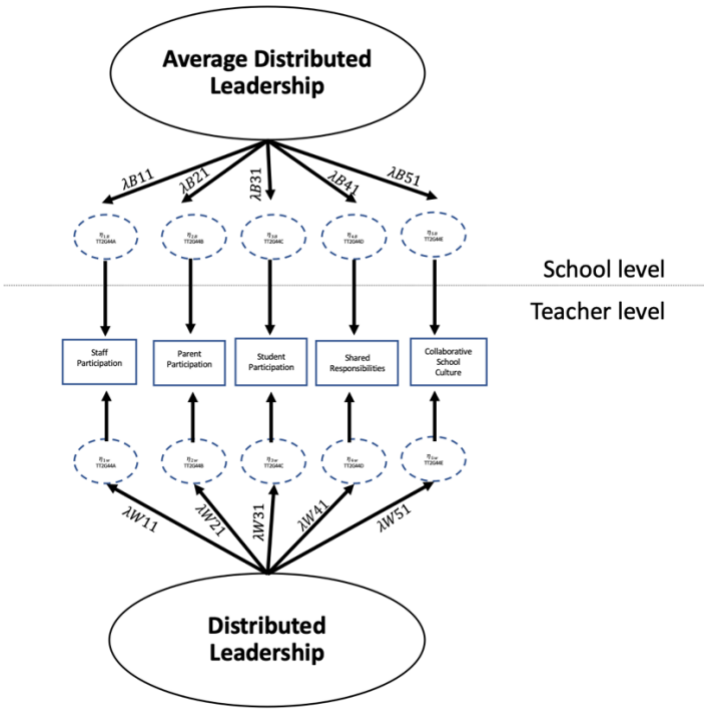


Figure 6. Distributed leadership model diagram with constrained factor loadings.

differentiated assignments (TT2G42C), how often do students get problems that refer to everyday life (TT2G42D), how often do students evaluate their own work (TT2G43E), and how often do students get immediate feedback (TT2G43F). Items measuring enhanced activities were also taken from the teacher-level and included: how often do students work in groups to find solutions (TT2G42B), how often do students work on projects that require at least one week to complete (TT2G42G), and how often do students use ICT for projects or class work (TT2G42H). The factor loadings of these latent variables were constrained across levels to develop configural cluster constructs (see Figures 7 and 8).

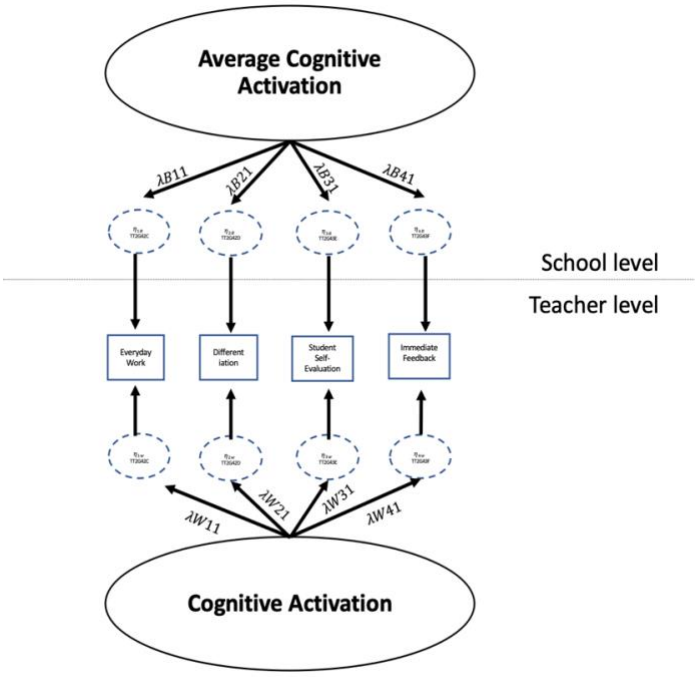


Figure 7. Cognitive activation model with constrained factor loadings.

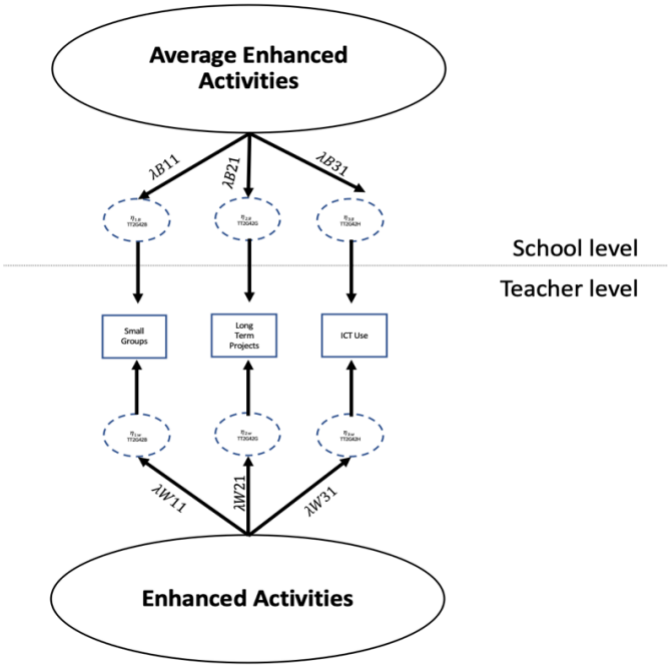


Figure 8. Enhanced activities model with constrained factor loadings.

After the development of these constructs, it is necessary to evaluate the model to make sure it is an appropriate measure of the data. To do this, the configural construct's multilevel CFA model fit information will be assessed to allow the researcher the ability to understand which items are the best measures, and the construct's reliability. Multiple model fit indices were used to evaluate the fit between the proposed model and the data. Two fit indices that can be considered as stand-alone indices, including their acceptable values, are the comparative fit index (CFI; Bentler, 1990) and the Tucker-Lewis index (TLI; Tucker & Lewis, 1973). Both of these indices are understood as acceptable if their values are above 0.90. Two other fit indices used to measure the model fit were the root mean square error approximation (RMSEA; Browne & Cudeck, 1992) and the standardized root mean residual (SRMR). Both of these indices are considered acceptable if their values are below 0.08. If these criteria are met, then the latent constructs cannot used.

Procedure for Research Question 1. Research question 1 is focused on how teacher perceptions of distributed leadership impact their use of innovative teaching practices. After developing the latent constructs, observing their ICC's and measuring them to see how well they fit the data through a multilevel CFA, a control model (model 1) was developed to analyze the amount of variance for which the control variables (teacher gender, teacher years of experience, teacher level of education, teacher need for professional development in ICT use for teaching, teacher need for professional development in new technologies for the workplace, principal gender, principal years-experience, principal level of education, school type, school size, and school average of

students coming from disadvantaged homes) accounted (see Figure 10) for the control model. In this model, the outcome variables of cognitive activation and enhanced activities were regressed only on the background variables at the school-level. The resulting model will indicate the amount of variance that the model accounts for. By then adding the focused predicting variable, distributed leadership, I developed a model (2). We can take the difference in the amount of variance accounted for by the two models and see a more precise estimate of the variance distributed leadership accounted for.

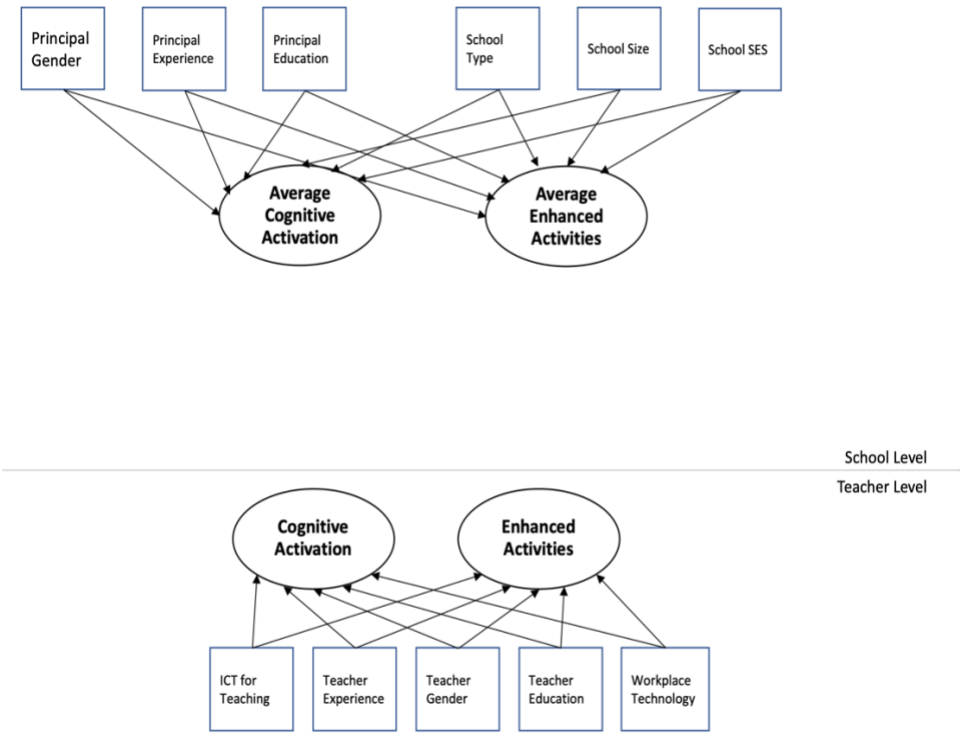


Figure 9. Control model (1).

After the control model was run, a multilevel multiple regression with latent and control variables were applied to examine the relationship between distributed leadership, and the two outcome variables cognitive activation and enhanced activities along with the other control variables. The results then determine if the relationship is significant and if it is significant if the relationship is positive, negative, and to what extent. The direction of the relationship and the weight were determined by the coefficients in the output.

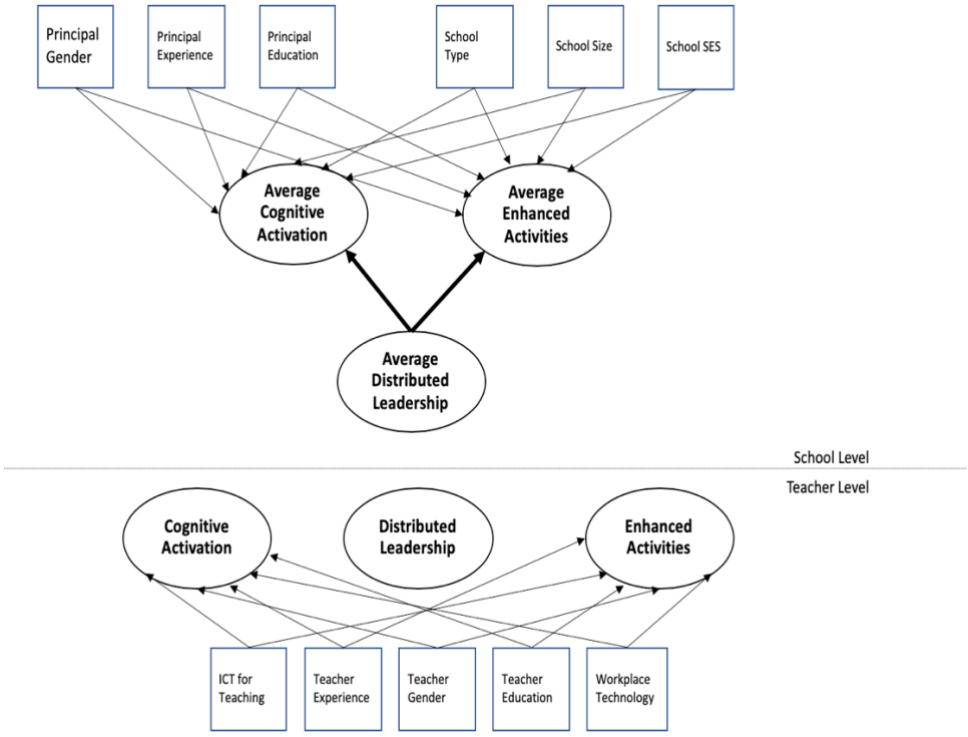


Figure 10. Research question 1 model (2).

Procedure for research question 2. Much like research question 1, for research question 2, the configural cluster constructs of cognitive activation and enhanced activities were used. The same control model was used from research question one, but also included the measures of school autonomy, which include school autonomy for

budgeting, staffing, and instructional policies. Since these measures already occur at the school-level, they do not need the same modeling that the other constructs did.

The three individual latent constructs of school autonomy (school autonomy for staffing, budgeting, and instructional policies) were used as predictors of the latent constructs of cognitive activation and enhanced activities from research question 1. Once these constructs were developed from the MCFA, the same control model that was used for research question one was utilized for research question two. This control model was used to analyze the amount of variance for which the control variables accounted. Similar to the procedure for research question 1, only the background variables were regressed on to understand the amount of variance they alone account for. From there the full model of school autonomy for budgeting, staffing, and instructional policies, and the other eleven control variables were regressed upon the outcome variables of cognitive activation and enhanced activities in a multilevel multiple regression with latent variables and control variables. The results were first examined for their significance. From there, similar to the steps of research question 1, the relationship was analyzed to understand if it is positive or negative and to what extent. The direction of the relationship and the weight was determined by the coefficients in the output.

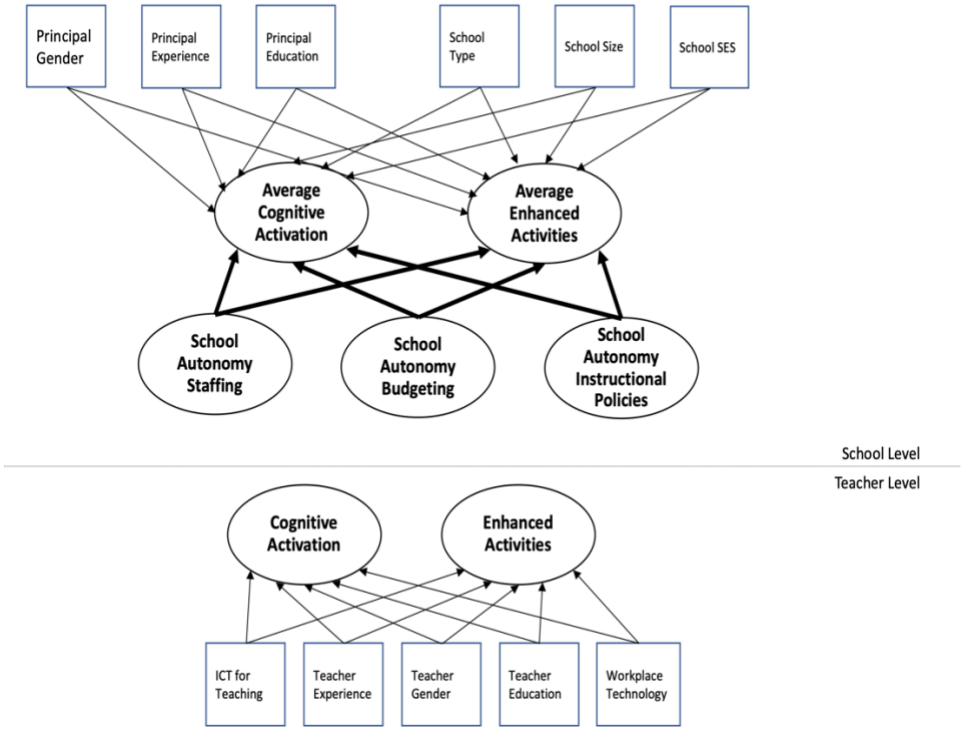


Figure 11. Research question 2 model (3).

Chapter 4

Findings

The purpose of this study was to analyze the impact of school autonomy and distributed leadership on teachers' use of innovative teaching strategies. Chapter 4 presents the findings of the two research questions that guide this study through the use of descriptive statistics and multilevel structural equation modeling.

Descriptive Statistics

Table 1 presents the number of participants, mean, standard deviation, and scale of the focused variables of the study: distributed leadership (i.e., how teachers perceive participation among stakeholders), innovative teaching practices (i.e., practices that promote cognitive activation or enhanced activities), and school autonomy (i.e., the level of autonomy for staffing, budgeting, and instructional policies). For the distributed leadership scale, responses ranged from 1 or strongly disagree to 4 or strongly agree. This is to say that as the mean of the responses increases the teachers perceive a higher level of distributed leadership. The mean of each of the five-items measuring distributed leadership was above 2.5, indicating that across items, the average teacher agrees that their school allows for some form of distributed leadership. Interestingly, the item asking teachers if they felt their school had a collaborative culture characterized by mutual support ranked highest of the items measuring distributed leadership, whereas the item measuring teachers' perceptions of their schools' ability to involve students in decision-

Table 1

Descriptive Statistics of Focused Variables

	N	Scale	Mean	STDV
Teacher Questions Measuring Distributed Leadership				
This school provides staff with opportunities to participate in school decisions	87731	1 = strongly disagree 2 = disagree	2.807	0.523
This school provides parents with opportunities to participate in school decisions	87478	3 = agree 4 = strongly agree	2.844	0.430
This school provides students with opportunities to participate in school decisions	87475		2.656	.0487
This school has a culture of shared responsibility for school issues	87445		2.833	0.492
There is a collaborative school culture which is characterized by mutual support	87536		2.881	0.511
Teacher questions measuring Innovative Practices				
Students work in small groups to come up with a joint solution to a problem	76355	1 = never or almost never 2 = occasionally	2.492	0.559
I give different work to students with difficulties or those who advance fast	76318	3 = frequently 4 = in all or nearly all lessons	2.411	0.686
I refer to a problem from everyday life or work	76294		2.927	0.544
I let students evaluate their own progress	76326		2.304	0.620
I observe students when working and provide immediate feedback	76365		3.081	0.568

	N	Scale	Mean	STDV
Teacher questions measuring Innovative Practices (cont'd)				
Students work on projects that require at least one week to complete	76076		2.138	0.707
Students use ICT for projects or classwork	76137		2.259	0.771
Principal questions measuring school autonomy				
School autonomy for staffing/pstffaut	5889	1 = no autonomy	2.135	0.670
School autonomy for budgeting/pbdgtaut	5889	2 = mixed level	1.494	0.583
School autonomy for instructional policies/pinsttaut	5889	3 = autonomous	2.031	0.430

making ranked the lowest. This could mean that teachers felt as though the culture of the building and the relationships between staff was more intentionally focused upon, rather than a focus on involving students in the decision-making process.

The innovative teaching practices scale also asked teachers to rank items on a 1-4 Likert scale, but this time 1 indicated that the teacher never or almost never used the practice. Conversely, a score of 4 on these items indicated that the teachers used the practice in all or near all of their lessons. Similar to the distributed leadership scale, an increase in the mean signifies an increase in the use of the practice. The mean across the items was above 2.1, which explains that the average use of innovative teaching practices for teachers in this survey was described as occasionally. This corroborates the findings from OECD and colleagues (2014).

The teaching practice used the most frequently by the teachers in this study was providing immediate feedback. There are several reasons this might be the case, without entirely speculating, it could be the most frequently used strategy as it is one of the only practices that are entirely in the teachers' control. Teachers can provide immediate feedback without any extra regulation or policy required. For example, it is much easier to make an adjustment to provide immediate feedback to their students than it is to use technology for learning when the technology does not exist at the school. The practice that was used the least frequently was not related to finances but related to time. Teachers reported that they use the practice of giving students projects that take at least one week to complete the least frequently out of all of the innovative practices. This could be for several reasons again, as this type of study does not delve into the 'why' it only describes

the baseline of teachers' use. One reason for the infrequency of use of this practice may be the time it requires. Many teachers feel pressured to move quickly through the curriculum and, therefore, do not believe they have the time to give students multiple weeks to work on a project (McLeod & Shareski, 2018).

The items measuring school autonomy were different in their development than the previous two constructs. Results of each question were used to create a scale that was recoded from 1-3 based on who the principal perceived to have the responsibility for that aspect of decision-making. The code indicates that a 1 describes a school as not autonomous. A 2 shows that school functions are the mixed responsibility of both external and internal personnel. A 3 signals strong school autonomy. Therefore, a higher mean score indicates a higher level of school autonomy for that component. Principals perceived the lowest level of school autonomy in regard to their autonomy for budgeting, whereas they perceived the highest levels in their autonomy for hiring. This low result for principal autonomy in budgeting is intriguing as it demonstrates that the majority of principals do not feel as though they have much control over the budgeting decisions that are taking place in their schools. This could prove to be an issue for teachers when they are interested in gaining funds for lessons. If principals do not have the autonomy in budgeting they may not be able to support their teachers even if they wanted to. Both constructs of autonomy for hiring and autonomy in instructional policies averaged above 2, indicating that the average principal in the study believed they had a mixed level of autonomy in those two fields.

Tables 2, 3, and 4 present the descriptive statistics derived from the principal survey, including gender, experience working as a principal in total, and highest degree earned. Table 2 shows that the personal background variable gender shows that the majority of principals in the survey (68%) identify as female. The range of principal experience in the study extends from 0 years of service to 47, with a mean of 8.5 years. Principal experience had a standard deviation of 7.129 which demonstrates that there is a sizeable difference in the number of years experience between principals in the study. Principal education was assessed by the International Standard Classification of Education (ISCE). A comparable scale by United States standards would be level 5B-bachelor's degree, 5A-master's degree, and 6-doctorate. The mean of 3.026 shows that the average principal in the study had the equivalent of a master's degree.

Table 2

TALIS Items Measuring Principal Gender

		Frequency	Percent
Valid	Female	4045	68.7
	Male	1844	31.3
	Total	5889	100.0

Table 3

TALIS Items Measuring Principal/School Background Variables

	N	Minimum	Maximum	Scale	Mean	Std. Deviation
Personal Background/ Experience/ Year(s) working as a principal in total	5889	0	47	1 = below ISCED level 5	8.550	7.129
Personal Background/ What is the highest level of formal education you have completed?	5889	1	4	2 = ISCED level 5B 3 = ISCED level 5A 4 = ISCED level 6	3.026	0.088
School Background/ Percentage of students with following characteristics/ Students from disadvantaged homes	5889	1	5	1 = none 2 = 1%-10% 3 = 11%-30% 4 = 31%-60% 5 = more than 60%	2.881	1.464
School Background/ What is the current school enrolment, i.e. the number of students of all grades/ages in this school?	5889	0	4335		518.629	503.453

Table 4

School Background - Is this School Publicly or Privately Managed?

		Frequency	Percent
Valid	Publicly managed	4911	83.4
	Privately managed	978	16.6
	Total	5889	100.0

School characteristics focused on the percentage of students within the school who come from disadvantaged homes, school enrollment, and the school type (public or private). The percentage of students coming from disadvantaged homes was broken down into five categories: none, 1%-10%, 11%-30%, 31%-60%, and more than 60%. The term "disadvantaged" was not defined by OECD and was left to the principal's definition. This would be problematic. However, international invariance was assessed on every item for the TALIS (2013) survey to make sure items were measured the same across settings.

The mean response from principals in the survey was 2.88, indicating that the majority of principals have schools where the disadvantaged student population is between 1% and 30%. The school enrollment item showed an average of 519 students per school. However, the high standard deviation of 503.453 shows that school size varied considerably between schools. The final school item of the school type, shown in Table 4, demonstrates that the majority of principals in this survey (83%) serve at publicly managed schools as opposed to privately managed ones.

Tables 5 and 6 present the descriptive statistics derived from the teacher survey, including gender, experience working as a teacher in total, highest degree earned,

Table 5

Teacher Background - Are you Female or Male?

	Frequency	Percent
Female	60890	69.0
Male	27356	31.0
Total	88246	100.0

professional development needs in ICT skills for teaching, and need for professional development in new technologies in the workplace. Table 5 shows that the personal background variable gender shows that the majority of teachers in the survey (68%) identify as female. Teacher experience, similar to the principal experience, is measured as the number of total years. Here the range of experience is from 0 to 58, with the mean number of years (16.450) being almost double that of the principal's experience. Similar to the principal results, there was a high standard deviation between the experience of teachers (10.519) in the study. This difference in age is another reason to utilize this item as a background variable in the study as it may be related to how frequently teachers are utilizing these practices. The background variable measuring teacher's highest degree completed utilized the same ISED scale and showed that teachers in this study, on average, had a bachelor's degree, and many completed their master's degrees.

The final two background variables for teachers came from their perceived need for professional development in a specific area. The scale for these items was 1-4, with 1 being no need at present, and 4 being high need at present. This means that as the value increases, so does the teachers' belief that they need professional development in that

Table 6

TALIS Items Measuring Teacher Background Variables

	N	Minimum	Maximum	Scale	Mean	Std. Deviation
Background/ how many years of work experience do you have?/ Year(s) working as a teacher in total	88246	0	58	1 = below ISCED level 5 2 = ISCED level 5B	16.450	10.519
Background/ What is the highest level of formal education you have completed?	88246	1	4	3 = ISCED level 5A 4 = ISCED level 6	2.936	0.116
Professional development/Needs/ICT skills for teaching	88246	1	4	1 = no need at present 2 = low level of need 3 = moderate level of need 4 = high level of need	2.608	0.888
Professional development/Needs/New technologies in workplaces	88246	1	4	1 = no need at present 2 = low level of need 3 = moderate level of need 4 = high level of need	2.676	0.872

area. The first item asks teachers to rate their need for professional development in ICT use for teaching. The second item asks teachers to rate their need for professional development in the use of new technologies in the workplace. Both items had mean scores of about 2.6, indicating that there is a low to moderate level of need for professional development around technology. This is important because it demonstrates that the average teacher understands that there are gaps in their knowledge and the use of technology. The following section moves beyond the descriptive statistics and utilizes the multilevel structural equation modeling to address the two research questions.

Measurement Results of Distributed Leadership, and Innovative Practices

In conducting this study, a valid measurement model was required prior to any regression. To address the research questions three distinct constructs were developed: distributed leadership, cognitive activation, and enhanced activities. Distributed leadership as a construct was measured by five items from the teacher survey, including school involves staff in decision-making (TT2G44A), school involves parents in decision-making (TT2G44B), school involves students in decision-making (TT2G44C), this school has a culture of shared responsibility (TT2G44D), and there is a collaborative school culture (TT2G44E). School autonomy was measured in three distinct scales from the principal survey: autonomy in budgeting, staffing, and instructional policies. While school autonomy was measured at the school-level, distributed leadership is a school-level construct with data coming from the teacher-level. This was also the case for the variables associated with innovative teaching practices. Four items were used to measure the construct of cognitive activation including, how often do students get differentiated

assignments (TT2G42C), how often do students get problems that refer to everyday life (TT2G42D), how often do students evaluate their own work (TT2G43E), and how often do students get immediate feedback (TT2G43F). Three items were used to measure the construct of enhanced activities including, how often do students work in groups to find solutions (TT2G42B), how often do students work on projects that require at least one week to complete (TT2G42G), how often do students use ICT for projects or class work (TT2G42H). Cognitive activation, enhanced activities, and distributed leadership were modeled as configural cluster constructs and measured at the school-level. This variation in levels then requires analysis to see if there is a need for the use of multilevel modeling.

Prior to the use of multilevel modeling, it is important to know the between-groups variations. To accomplish this, interclass correlation coefficients (ICCs) were used to estimate the amount of between-groups variations (Muthén, 1994). The ICCs indicate the proportion of variance in an observed variable found at the between-level, in this case the school-level. This is an important step in the process because if there was no significant variation between schools, then there would be no need for the use of multilevel modeling. As shown in Tables 7, 8, and 9 the ICCs for each item that was collected at the teacher-level and used at the school-level had a value above the required 0.05 (Dyer, Hanges, & Hall, 2005) and the median 0.12 (James, 1982), suggesting that a multilevel analysis was warranted.

Since the test of interclass correlation corroborated the hypothesized need for multilevel modeling, a multilevel confirmatory factor analysis (MCFA) was then conducted for the three latent constructs. The MCFA is used to determine whether the

Table 7

Standardized Variances, Cluster Size, ICC (1) and ICC (2) Cognitive Activation

Cognitive Activation	level-2 variance	level-1 variance	Average cluster size	ICC (1)	ICC (2)
Differentiation	0.107	0.577	14.985	0.161	0.735
Everyday Problems	0.046	0.487	14.985	0.083	0.586
Self-Evaluation	0.085	0.547	14.985	0.132	0.700
Immediate Feedback	0.084	0.494	14.985	0.111	0.718

Note: ICC = Intraclass correlation.

Table 8

Standardized Variances, Cluster Size, ICC (1) and ICC (2) Enhanced Activities

Enhanced Activities	level-2 variance	level-1 variance	Average cluster size	ICC (1)	ICC (2)
Small Groups	0.071	0.482	14.985	0.128	0.688
Long Term Projects	0.075	0.626	14.985	0.103	0.642
ICT Use	0.147	0.628	14.985	0.181	0.778

Note: ICC = Intraclass correlation.

Table 9

Standardized Variances, Cluster Size, ICC (1) and ICC (2) Distributed Leadership

Distributed Leadership	level-2 variance	level-1 variance	Average cluster size	ICC (1)	ICC (2)
Staff Participation	0.094	0.438	14.985	0.177	0.763
Parent Participation	0.061	0.377	14.985	0.140	0.708
Student Participation	0.01	0.415	14.985	0.166	0.745
Shared Responsibilities	0.085	0.408	14.985	0.173	0.757
Collaborative Culture	0.096	0.419	14.985	0.183	0.774

Note: ICC = Intraclass correlation.

hypothesized construct is an appropriate measurement of the sample. Following the work of Stapleton et al. (2016), the factor loadings of the teacher-level items were constrained to be equal across levels. This was done to assure that the constructs were measured appropriately. All of the factor loadings were assessed to determine their saliency. A "salient" factor loading defined by Brown (2006) is one with a standardized loading greater than 0.30. In this study, any item with a factor loading less than 0.30 was removed. The factor loadings for each latent construct are presented in Tables 10, 11, and 12. The model diagrams are shown in Figures 11, 12, and 13.

Table 10

Standardized Factor Loadings of Cognitive Activation as a Configural Construct

	Estimate	s.e.	p
Teacher-Level			
Differentiation	0.481	0.008	0.000
Everyday Problems	0.445	0.008	0.000
Self-Evaluation	0.492	0.009	0.000
Immediate Feedback	0.467	0.008	0.000
School-Level			
Differentiation	0.567	0.025	0.000
Everyday Problems	0.702	0.026	0.000
Self-Evaluation	0.643	0.027	0.000
Immediate Feedback	0.664	0.028	0.000

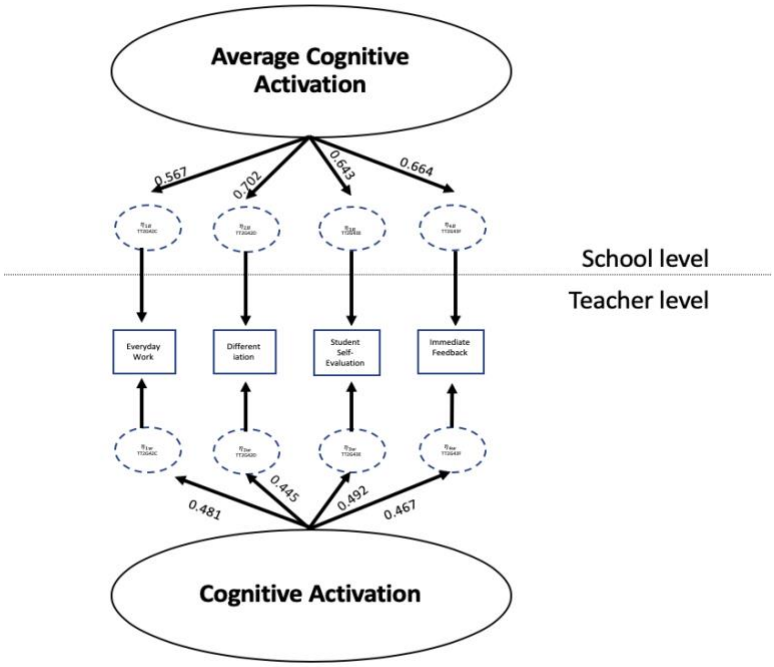


Figure 12. MCFA model diagram of cognitive activation with standardized factor loadings.

Table 11

Standardized Factor Loadings of Cognitive Activation as a Configural Construct

	Estimate	s.e.	p
Teacher-Level			
Small Groups	0.463	0.014	0.000
Long Term Projects	0.586	0.014	0.000
ICT Use	0.541	0.016	0.000
School-Level			
Small Groups	0.672	0.035	0.000
Long Term Projects	0.913	0.038	0.000
ICT Use	0.607	0.028	0.000

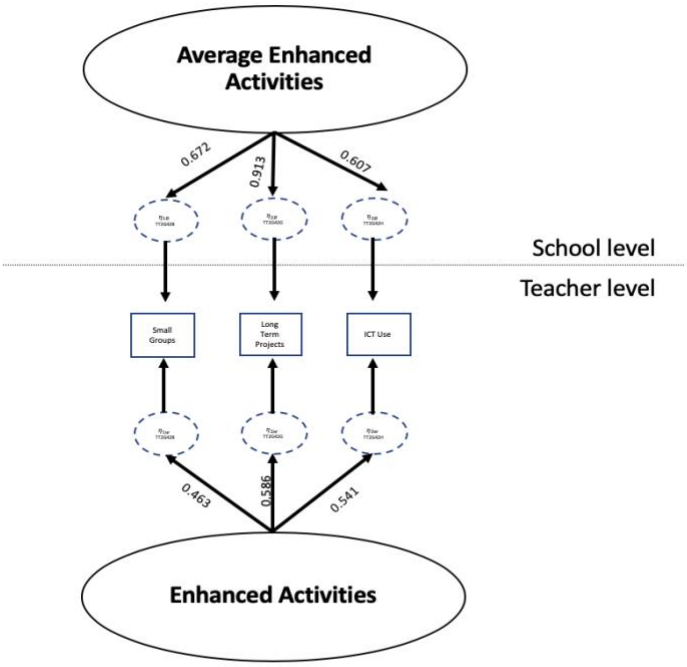


Figure 13. MCFA model diagram of enhanced activities with standardized factor loadings.

Table 12

Standardized Factor Loadings Distributed Leadership

	Estimate	s.e.	p
Teacher-Level			
Staff Participation	0.773	0.007	0.000
Parent Participation	0.693	0.011	0.000
Student Participation	0.698	0.009	0.000
Shared Participation	0.773	0.009	0.000
Collaborative Culture	0.718	0.011	0.000
School-Level			
Staff Participation	0.916	0.011	0.000
Parent Participation	0.871	0.013	0.000
Student Participation	0.830	0.015	0.000
Shared Participation	0.924	0.011	0.000
Collaborative Culture	0.866	0.015	0.000

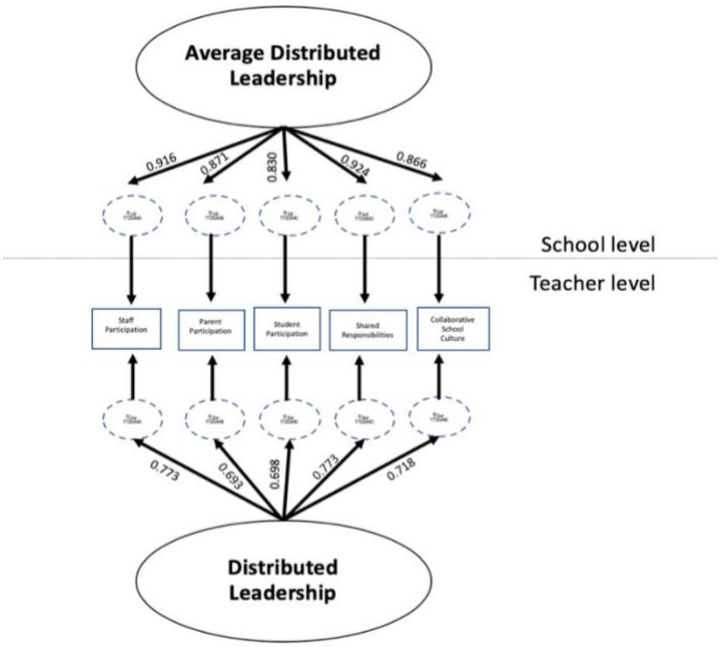


Figure 14. MCFA model diagram of distributed leadership with standardized factor loadings.

Multiple model fit indices were used to evaluate the fit between the proposed MCFA models and the data. The following stand-alone fit indices and their acceptable values included were: the comparative fit index (CFI; Bentler, 1990) and the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), both acceptable if above 0.90; and the root mean square error approximation (RMSEA; Browne & Cudeck, 1992) and the standardized root mean residual (SRMR), both acceptable if below 0.08.

In the analysis of complex survey data, the statistical program Mplus (8.0) uses maximum likelihood estimation with robust standard errors (MLR) to address issues of missing values, sampling weight at the teacher and school-level, and non-normal data. The multilevel model fit indices for the construct of cognitive activation were CFI = 0.961, TLI = 0.933, RMSEA = 0.014, SRMR (W) = 0.023, and SRMR (B) = 0.047. These indices indicate that the construct of cognitive activation was a good fit for the data. The construct of enhanced activities demonstrated a good fit of the multilevel model with CFI = 0.992, TLI = 0.977, RMSEA = 0.009, SRMR (W) = 0.006, and SRMR (B) = 0.056. The factor loadings of distributed leadership were constrained the same way the loadings of cognitive activation and enhanced activities were. The multilevel model fit indices for distributed leadership were CFI = 0.896, TLI = 0.851, RMSEA = 0.041, SRMR (W) = 0.056, and SRMR (B) = 0.054. In addition to having a good fit in a model, model parameters should also have reasonable magnitudes based on previous research and theory. These results are presented in Table 13.

Table 13

Model Fit Indices MCFA

Latent Variable	X2	df	AIC	CFI	TLI	RMSEA	SRM_W	SRMR_B
Cognitive Activation	147.328	7	857825.912	0.961	0.933	0.014	0.023	0.047
Enhanced Activities	18.302	2	666406.955	0.992	0.977	0.009	0.006	0.056
Distributed Leadership	2729.645	14	919225.952	0.896	0.851	0.041	0.056	0.054

Regression Results of Control Model for Both Research Questions 1 and 2

A control model (a) was developed as a foundation model to obtain an estimated r-square. This control model does not include any of the focused predictors of distributed leadership or school autonomy. The estimated r-square results of the control model can then be compared to the estimated r-square results of the distributed leadership; (b) school autonomy; and (c) models to see how much extra variance is explained by distributed leadership and school autonomy. The estimated results of the control model (a) are presented in Table 14 followed by the estimated results of the distributed leadership; (b) the estimated results of the school autonomy model, and (c) in Tables 15 and 16, respectively.

Table 14

Estimated R-Squares from the Teacher-Level and School-Level Control Models

	Estimate	s.e.	p
Teacher-Level			
Cognitive Activation	0.017	0.004	0.000
Enhanced Activities	0.015	0.003	0.000
School-Level			
Average Cognitive Activation	0.092	0.025	0.000
Average Enhanced Activities	0.112	0.030	0.000

Table 15

Estimated R-Squares Research Question 1 Model

	Estimate	s.e.	p
Teacher-Level			
Cognitive Activation	0.017	0.004	0.000
Enhanced Activities	0.015	0.003	0.000
School-Level			
Average Cognitive Activation	0.216	0.038	0.000
Average Enhanced Activities	0.154	0.032	0.000

Table 16

Estimated R-Squares Research Question 2 Model

	Estimate	s.e.	p
Teacher-Level			
Cognitive Activation	0.017	0.004	0.000
Enhanced Activities	0.015	0.003	0.000
School-Level			
Average Cognitive Activation	0.210	0.039	0.000
Average Enhanced Activities	0.144	0.035	0.000

Regression Results of Research Question 1

Once the measurement model was developed and showed sound psychometric properties, the next step in the process was to estimate school autonomy and distributed leadership's statistical effect on teachers' use of innovative teaching practices. To do so, a model with the outcome variables and only the 11 teacher, principal, and school background variables were used as predictors. This was done to get a baseline for the amount of variance that these predictors accounted for prior to the inclusion of the key

predictors distributed leadership and school autonomy. The standardized results showed that the five background variables at the teacher-level explained 1.7% of the variance when predicting cognitive activation, and 1.5% of the variance for enhanced activities. At the school-level, the six background variables explained 9.2% of the variance when predicting cognitive activation, and 11.2% of the variance for enhanced activities. The results of the model (1) can be seen in Tables 14 and 15. The total variance accounted for at each level is presented in Tables 16, 17, and 18. To answer the research questions, the full model was then developed, which includes the key predictors of distributed leadership and school autonomy. The estimates of the standardized regression coefficients for research question can be found in Table 19. The results from research question two are presented in Table 20. The model diagrams with estimated effects are presented in Figures 15 for research question one, and Figure 16 research question two. It is recommended that path coefficients effect size can be interpreted as small if it has an absolute value of less than 0.10; medium effect is around 0.30; and a large effect is anything greater than 0.50 (Kline, 2005).

Research question 1: Distributed leadership and innovative teaching practices. The results of the analysis showed that distributed leadership had a statistically significant and positive effect on cognitive activation ($\beta = 0.360$, $p < .001$). Distributed leadership also showed a statistically significant and positive effect on enhanced activities ($\beta = 0.172$, $p < 0.001$). The distributed leadership model at the teacher-level explained about 1.7% of the total variance in cognitive activation and 21.6% of the total

Table 17

Standardized Model (1) Results Cognitive Activation

DV	IV	Estimate	s.e.	p
Teacher-Level				
Cognitive Activation	Teacher Gender	-0.102	0.016	0.000
	Teacher Education	-0.019	0.012	0.118
	Teacher Experience	0.050	0.016	0.002
	PD in Tech for Instruction	-0.067	0.019	0.000
	PD in Tech for Work	0.064	0.019	0.001
School-Level				
Cognitive Activation	Principal Gender	-0.186	0.047	0.000
	Principal Education	-0.019	0.045	0.675
	Principal Experience	0.149	0.037	0.000
	School Type	-0.128	0.055	0.021
	School Size	-0.064	0l038	0.093
	School SES	0.145	0.050	0.004

Table 18

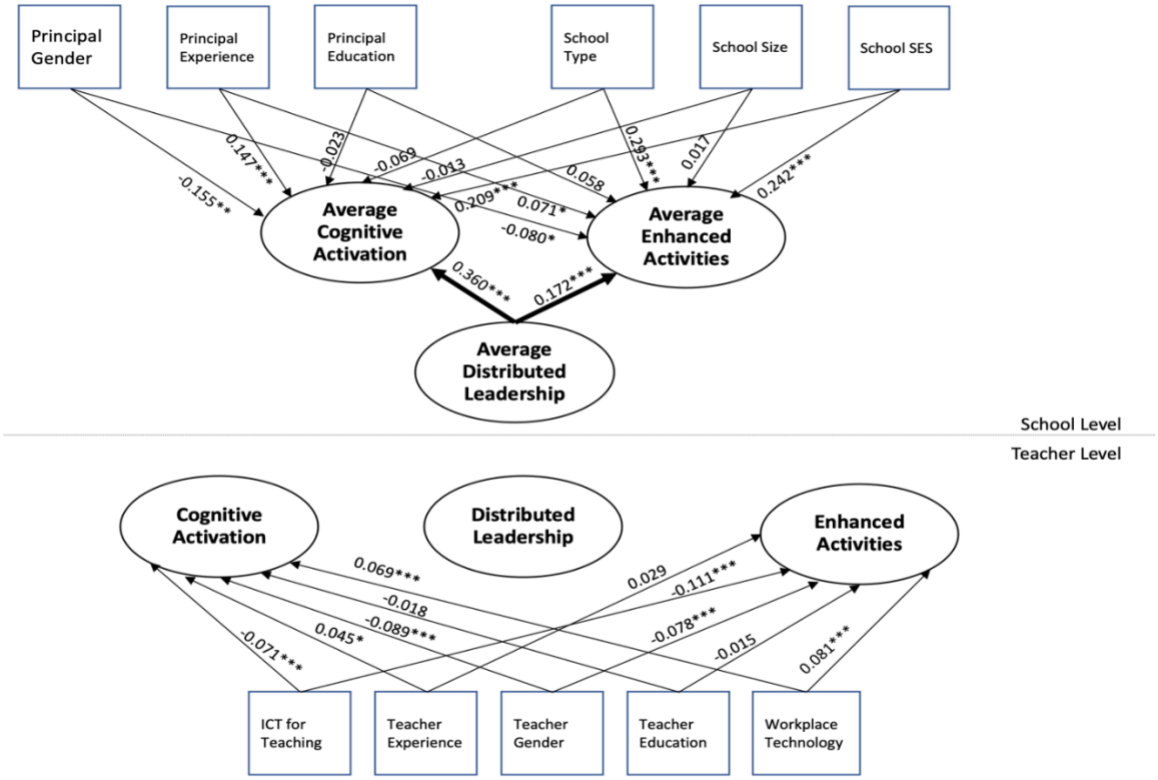
Standardized Model (1) Results Enhanced Activities

DV	IV	Estimate	s.e.	p
Teacher-Level				
Enhanced Activities	Teacher Gender	-0.078	0.014	0.000
	Teacher Education	-0.015	0.051	0.317
	Teacher Experience	0.029	0.015	0.052
	PD in Tech for Instruction	-0.110	0.018	0.000
	PD in Tech for Work	0.080	0.016	0.000
School-Level				
Enhanced Activities	Principal Gender	-0.105	0.041	0.010
	Principal Education	0.060	0.041	0.139
	Principal Experience	0.077	0.045	0.090
	School Type	0.274	0.052	0.000
	School Size	-0.007	0.036	0.845
	School SES	0.217	0.050	0.000

Table 19

Estimates of the Standardized Regression Coefficients from Research Question 1

DV	IV	Estimate	s.e.	p
Teacher-Level				
Cognitive Activation	Teacher Gender	-0.089	0.016	0.000
	Teacher Education	-0.018	0.013	0.170
	Teacher Experience	0.045	0.016	0.006
	PD in Tech for Instruction	-0.071	0.019	0.000
	PD in Tech for Work	0.069	0.019	0.000
School-Level				
Cognitive Activation	Distributed Leadership	0.360	0.47	0.000
	Principal Gender	-0.155	0.048	0.001
	Principal Education	-0.023	0.045	0.604
	Principal Experience	0.147	0.037	0.000
	School Type	-0.069	0.055	0.207
	School Size	-0.013	0.037	0.714
	School SES	0.217	0.050	0.000
Teacher-Level				
Enhanced Activities	Teacher Gender	-0.078	0.014	0.000
	Teacher Education	-0.015	0.015	0.331
	Teacher Experience	0.029	0.015	0.054
	PD in Tech for Instruction	-0.111	0.018	0.000
	PD in Tech for Work	0.081	0.016	0.000
School-Level				
Enhanced Activities	Distributed Leadership	0.172	0.049	0.000
	Principal Gender	-0.080	0.040	0.047
	Principal Education	0.058	0.041	0.151
	Principal Experience	0.071	0.045	0.012
	School Type	0.293	0.050	0.000
	School Size	0.017	0.035	0.635
	School SES	0.242	0.049	0.000



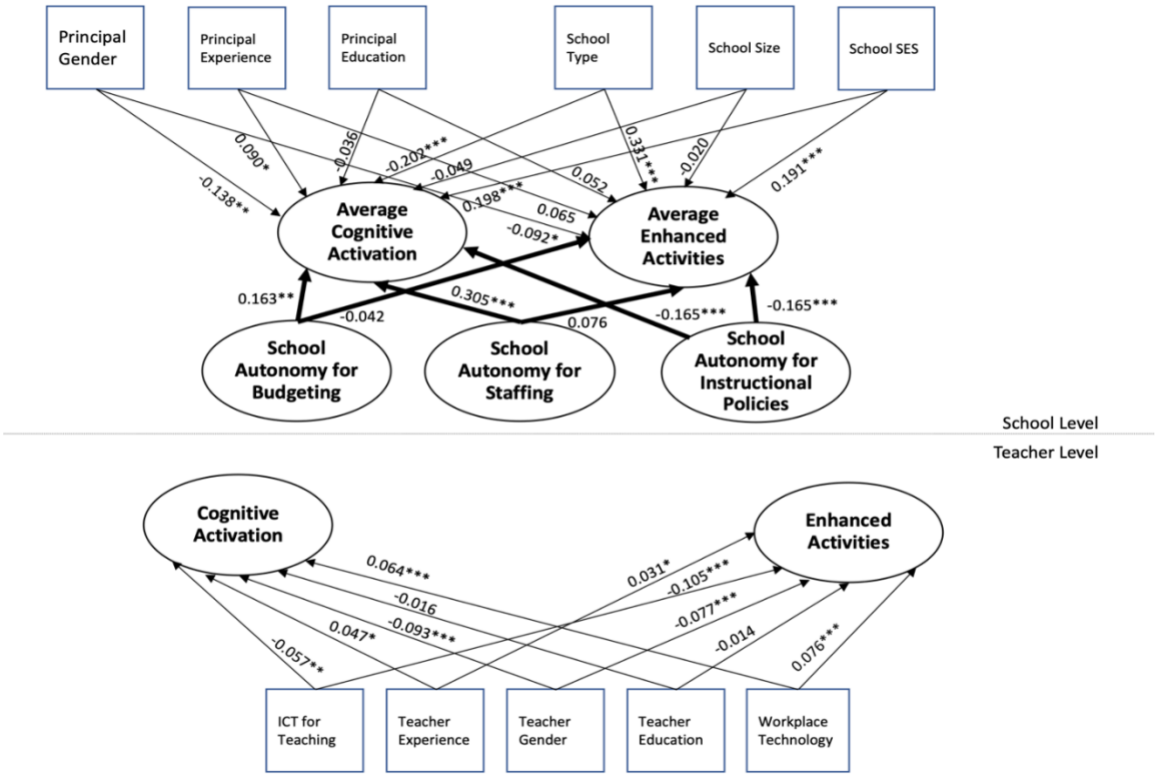
*p <0.05. **p <0.01. ***p< 0.001.

Figure 15. Standardized model diagram research question 1.

Table 20

Estimates of the Standardized Regression Coefficients from Research Question 2

DV	IV	Estimate	s.e.	p
Teacher-Level				
Cognitive Activation	Teacher Gender	-0.093	0.016	0.000
	Teacher Education	-0.016	0.012	0.212
	Teacher Experience	0.047	0.017	0.005
	PD in Tech for Instruction	-0.057	0.019	0.003
	PD in Tech for Work	0.064	0.019	0.001
School-Level				
Cognitive Activation	Autonomy Budgeting	0.163	0.059	0.006
	Autonomy Instruction	-0.165	0.050	0.001
	Autonomy Staffing	0.305	0.049	0.000
	Principal Gender	-0.138	0.046	0.003
	Principal Education	-0.036	0.040	0.365
	Principal Experience	0.090	0.038	0.019
	School Type	-0.202	0.057	0.000
	School Size	-0.049	0.038	0.194
	School SES	0.198	0.049	0.000
Teacher-Level				
Enhanced Activities	Teacher Gender	-0.077	0.015	0.000
	Teacher Education	-0.014	0.015	0.381
	Teacher Experience	0.031	0.016	0.045
	PD in Tech for Instruction	-0.105	0.018	0.000
	PD in Tech for Work	0.076	0.017	0.000
School-Level				
Enhanced Activities	Autonomy Budgeting	-0.042	0.061	0.495
	Autonomy Instruction	-0.165	0.049	0.001
	Autonomy Staffing	0.076	0.051	0.135
	Principal Gender	-0.092	0.040	0.022
	Principal Education	0.052	0.043	0.225
	Principal Experience	0.065	0.047	0.171
	School Type	0.331	0.055	0.00
	School Size	-0.020	0.038	0.593
	School SES	0.191	0.053	0.000



*p <0.05. **p <0.01. ***p< 0.001.

Figure 16. Standardized model diagram research question 2.

variance at the school-level. This means after controlling for covariates, distributed leadership explained about 19.9% of the total variance in cognitive activation at the school-level. The distributed leadership model at the teacher-level explained about 1.5% of the total variance in enhanced activities and 15.4% of the total variance at the school-level. This means after controlling for covariates, distributed leadership explained about 13.9% of the total variance in enhanced activities at the school-level. For cognitive activation among all 12 predictors, distributed leadership presented the largest effect on cognitive activation and the third-largest effect on enhanced activities.

Background variables and cognitive activation. When analyzing the results of the teacher-level background variables teacher gender, experience, professional development in technology for instruction, and professional development in technology for work all were significant predictors of cognitive activation. At the school-level principal gender, principal experience, and school percentage of students coming from disadvantaged homes were all statistically significant. Teacher gender ($\beta = -0.089$, $p < .000$) was the largest teacher-level predictor followed by professional development in technology for instruction ($\beta = -0.071$, $p < .000$), and professional development in technology for work ($\beta = -0.069$, $p < .000$). From the school-level school percentage of students coming from disadvantaged homes was the second largest predictor ($\beta = 0.209$, $p < .000$), followed by principal gender ($\beta = -0.155$, $p < .001$), and principal experience ($\beta = 0.0147$, $p < .000$). The estimates of the standardized regression coefficients can be found in Table 19.

Background variables and enhanced activities. When analyzing the results of the teacher-level background variables teacher gender, professional development in technology for instruction, and professional development in technology for work all were significant predictors of cognitive activation. At the school-level principal gender, principal experience, school type (public or private) and school percentage of students coming from disadvantaged homes were all statistically significant. Professional development in technology for instruction ($\beta = -0.111$, $p < .000$) was the largest teacher-level predictor followed by professional development in technology for work ($\beta = 0.081$, $p < .000$), and teacher gender ($\beta = -0.078$, $p < .000$). At the school-level School type

(public or private) ($\beta = 0.293$, $p < .000$) was the largest predictor of enhanced activities followed by, school percentage of students coming from disadvantaged homes ($\beta = 0.242$, $p < .000$), and principal gender ($\beta = -0.080$, $p < .047$) was the third strongest background predictor of enhanced activities. The estimates of the standardized regression coefficients can be found in Table 19.

Regression Results of Research Question 2: School Autonomy and Innovative Teaching Practices

The results of analysis show that each of the three scales of school autonomy were statistically significant predictors of cognitive activation, autonomy in budgeting ($\beta = 0.163$, $p < .006$) autonomy in instruction ($\beta = -0.165$, $p < .001$) and autonomy in staffing ($\beta = 0.305$, $p < .000$). Only one of the school autonomy scales presented a statistically significant effect on enhanced activities, autonomy in instruction ($\beta = -0.165$, $p < .001$). The school autonomy model explained about 1.7% of the total variance in at the teacher-level in cognitive activation and 21.0% of the variance at the school-level. This means after controlling for covariates, school autonomy explained about 19.3% of the total variance in cognitive activation. The school autonomy model explained about 1.5% of the total variance in enhanced activities at the teacher-level and 14.4% at the school-level. This means after controlling for covariates, school autonomy explained about 12.9% of the total variance in enhanced activities. School autonomy for staffing presented the largest effect on cognitive activation out of all of the 14 predictors for cognitive activation. Autonomy in instruction presented as the strongest predictor of enhanced activities. followed by Regarding enhanced activities, none of the measures of

school autonomy had a significant impact on the frequency in which teachers utilized the measured innovative teaching strategies. The estimates of the standardized regression coefficients can be found in Table 20 and diagramed in Figure 16.

Background variables and cognitive activation. When analyzing the results of the teacher-level background variables teacher gender, experience, professional development in technology for instruction, and professional development in technology for work all were significant predictors of cognitive activation. At the school-level, principal gender, principal experience, school type (public or private) and school percentage of students coming from disadvantaged homes were all statistically significant. Teacher gender ($\beta = -0.093$, $p < .000$) was the largest teacher-level predictor followed by professional development in technology for work ($\beta = 0.064$, $p < .001$), and professional development in technology for instruction ($\beta = -0.057$, $p < .003$). From the school-level, school type (public or private) ($\beta = -0.202$, $p < .000$) was the second largest predictor of enhanced activities. School percentage of students coming from disadvantaged homes was the third largest predictor ($\beta = 0.198$, $p < .000$). The estimates of the standardized regression coefficients can be found in Table 20.

Background variables and enhanced activities. When analyzing the results of the teacher-level background variables teacher gender, teacher experience, professional development in technology for instruction, and professional development in technology for work all were significant predictors of enhanced activities. At the school-level principal gender, school type (public or private) and school percentage of students coming from disadvantaged homes were all statistically significant. Professional

development in technology for instruction ($\beta = -0.105$, $p < .000$) was the largest teacher-level predictor followed by teacher gender ($\beta = -0.077$, $p < .000$), and professional development in technology for work ($\beta = 0.076$, $p < .000$). At the school-level school type (public or private) ($\beta = 0.331$, $p < .000$) was the largest predictor of enhanced activities followed by, school percentage of students coming from disadvantaged homes ($\beta = 0.191$, $p < .000$), and principal gender ($\beta = -0.092$, $p < .022$) was the third strongest background predictor of enhanced activities. The estimates of the standardized regression coefficients can be found in Table 20.

Chapter 5

Discussion

Chapter 5 provides discussion of the results that were presented in Chapter 4 in three sections. The first section includes a summary of the major findings from the analysis. The second section discusses the limitations of the study. The third section focuses on the implications for practice. The fourth and final section addresses directions for future research.

Summary of Major Findings

This study utilized cross-national data from the 2013 Teaching and Learning International Survey (TALIS) to analyze the relationships that exist between school autonomy and distributed leadership and teachers' use of innovative teaching practices. A series of multilevel linear regressions were performed to analyze the relationships between the two constructs of school autonomy and distributed leadership, and the constructs of cognitive activation and enhanced activities. The purpose of the analysis was to understand how school autonomy and distributed leadership impacted teachers' use of innovative teaching practices, as OECD and colleagues (2014) defined them. School autonomy and distributed leadership were specifically analyzed because their effects were not clear. Some authors believe that autonomy makes no difference (Caldwell, 2016). Others believe autonomy is critical to how educators innovate (Neeleman, 2019; OECD et al., 2014).

The findings of this study affirm the complexities surrounding school autonomy and distributed leadership. Simply giving teachers and schools, more autonomy in

decision-making is not enough. The study does demonstrate the significant relationship between school autonomy and distributed leadership and the specific outcomes of practice. If the goal of schools is to prepare students for their futures, then understanding how leadership can bolster or impede teachers' use of innovative practices is an essential first step. A caveat to the previous statement is that all of the findings represent correlational effects. No causal effect could be inferred from this analysis.

To what extent is distributed leadership related to teachers' use of innovative teaching practices? In this study, distributed leadership was used as a predictor of the two components that comprise innovative teaching practices, cognitive activation, and enhanced activities. Moolenaar et al. (2010) explained that principals are under increased pressure to utilize these types of innovative teaching practices as ways to bolster student achievement. Distributed leadership and innovative teaching practices were both measured from the teacher perspective, but distributed leadership was operationalized as a school-level construct and used as a top-down predictor of innovative teaching practices. The analysis of interclass correlation supported the use of this type of multilevel modeling.

The findings from the first research question suggest that distributed leadership is not only a significant and positive predictor of both aspects of teachers' use of innovative teaching practices, but the strongest predictor for cognitive activation and the third strongest for enhanced activities. Instructionally, this finding is consistent with the work of Harris et al. (2007). The authors point out that to enhance their instructional leadership, school leaders should adopt a more inclusive view of instructional leadership

where leadership is distributed and understood as a shared activity between multiple stakeholders. As the findings of this study demonstrate, when teachers are empowered to be decision-makers, they are significantly more likely to utilize strategies that can prepare students for their futures.

The findings from this study are also consistent with those of OECD and colleagues (2014), which expressed the need for teachers and administrators to feel invested in the work for innovation to occur. This idea is echoed by the work of Le Donné et al. (2016), who point out that for change to occur, teachers and administrators alike need to be motivated. Distributed leadership, in this sense, allows for more opportunities for multiple stakeholders to be invested in the work, ultimately increasing their motivation (Le Donné et al., 2016) and autonomy (Pont, Nusche, & David, 2008; Stege, Kik, & van Groningen, 2015).

This finding demonstrates that the way schools share their decision-making authority has a significant and positive impact on the use of these specific teaching practices. While causality cannot be established through this type of analysis, we learn that teachers in buildings with higher levels of shared decision-making utilize practices that utilize cognitive activation in students as well as more enhanced activities.

For principals, similar to the findings of Klar (2012), the work of the principal is far too overwhelming a job to complete for a single leader. This sentiment can then be extended to the work that must take place to cultivate a school willing to adjust in order to prepare students for their futures. If the current system in which principals are working

is too overwhelming, then a more collaborative approach should be used to alter the status quo in favor of these innovative practices (Anderson, 2012).

The findings also demonstrate how distributed leadership draws upon distributed cognition and Activity Theory, as described by Ho et al. (2016). In Activity Theory, the unit of analysis is the activity itself; in this case, teachers' use of innovative teaching practices. How labor is divided between formal and informal leaders then impacts the degree to which actions are carried out. In this study, distributed leadership described the division of labor between formal (principals) and informal (teachers, parents, and students) stakeholders and measured the impact it had on the outcome of teachers' use of innovative practices. The decision-making and capacity building are then coalesced to empower educators to make decisions that they believe will better serve their students.

This inclusive view of leadership, interestingly, is more impactful on the frequency in which teachers utilize activities that focus on cognitive activation rather than those that center on enhanced activities. While both correlations are significant and positive, the relationship between distributed leadership and cognitive activation ($\beta = 0.360$, $p < 0.001$), is more than double that of the same relationship with enhanced activities ($\beta = 0.172$, $p < 0.001$). This is a salient finding as it speaks to the role distributed leadership plays with specific teaching practices. The reason for this difference cannot be inferred from this study, but it can be understood to be an interesting result.

To what extent is school autonomy in staffing, budgeting, and instructional policies related to teachers' use of innovative teaching practices? School autonomy as a practice refers to the authority of school leaders to self-govern in relation to the degree of state intervention (Hooge, 1994). In this study, school autonomy in budgeting, staffing, and instructional policies was used to predict two outcome variables, teachers' use of practices that utilize cognitive activation, and practices that utilize enhanced activities. These three scales were intentionally separated to identify the specific impacts of each on both of the outcome variables.

The analysis revealed some unanticipated findings with regard to the relationship between school autonomy and teachers' use of innovative teaching practices. The study hypothesized that an increased amount of school autonomy would lead to teachers utilizing innovative teaching practices more frequently. While this was the case for teaching practices that utilize cognitive activation, the multilevel model showed that only one aspect of school autonomy, autonomy in instructional policies, was significantly associated with teachers' use of innovative teaching practices that use enhanced activities. In other words, all three aspects of school autonomy are significant predictors of cognitive activation, but not necessarily enhanced activities. To address the second research question more specifically, the effects each predictor had on each outcome variable will be discussed.

Cognitive activation. The results of the study indicate that each of the three school autonomy indices were statistically significant predictors of cognitive activation. Both autonomy in budgeting and autonomy in staffing were positive predictors. This is to

say, that as principals are given more autonomy in their decision-making focused on budgeting, such as establishing teachers' salaries, or more autonomy in staffing, such as hiring, teachers are more likely to utilize innovative practices that incorporate cognitive activation. This is a salient finding not only because of the statistical significance but also because of the opposite directionality of school autonomy for instructional policies results. The results of the study showed that principal autonomy for instructional policies was a negative predictor of the use of cognitive activation. This means that as principals gain autonomy in instructional policies, such as course offerings, teachers were less likely to utilize cognitive activation practices.

These finding shows the intricacies associated with understanding the role school autonomy plays. When principals are afforded more autonomy in budgeting and staffing teachers are more likely to utilize cognitive activation, however, when principals have more autonomy in instructional policies then teachers are less likely. The positive relationship between budgeting and staffing for teachers' use of cognitive activation could be understood as initially hypothesized. When the school has more autonomy for budgeting and staffing then the teachers are able to utilize the practices they believe are most impactful for their students. The negative relationship finding could be understood as when principals gain autonomy in instructional policies then teachers feel less inclined to utilize these practices because they do not want to differ from their principals' desires in the instructional realm. If the principal had more say instructionally, then maybe the teachers feel as though they have less.

These findings build on the results of the study presented by Liu et al. (2018), where they examined how school factors influenced school autonomy for staffing, budgeting, and instructional policies. The authors found that school type (public or private), principal training, principal employment (full or part-time), and school location were all significant predictors of school autonomy. Their study utilized school autonomy as an outcome as opposed to a predictor. This study did the opposite. Building on their work, we can examine beyond what factors impact school autonomy and investigate how school autonomy impacts teachers' use of specific instructional practices. The results of this study show that a more comprehensive classification of school autonomy is necessary, as Neeleman (2019) pointed out. This finding indicates that school autonomy is one way in which principals can impact practice.

Enhanced activities. The results of the study centered around school autonomy and its impact on teachers utilizing practices that could be considered as enhanced activities also presented unanticipated findings. It was hypothesized that as schools gain autonomy across the three scales that teachers would feel more comfortable and capable to utilize these types of practices. The results indicate that school autonomy in instructional policies ($\beta = -0.165$, $p < 0.001$) was the only statistically significant predictor of teachers' use of enhanced activities.

These findings are unanticipated, as Neeleman (2019) expressed the need for school autonomy in the same three facets of education to promote innovation. His major critique of school autonomy was that blanket autonomy would not suffice. What is interesting about the role of school autonomy and enhanced activities is two-fold. One, it

is intriguing that school autonomy in budgeting and staffing do not have a statistically significant relationship with teachers' use of enhanced activities since they had strong positive relationships with cognitive activation. Second, the relationship between school autonomy for instructional policies has the same negative impact on enhanced activities as it did cognitive activation. These findings are unanticipated as one would assume the relationships would either be consistent or different between the two innovative teaching practices. The results do point out that school autonomy in instructional policies is a negative predictor of both aspects of innovative teaching practices.

Considering the results of the analysis, two major challenges with school autonomy and teachers' use of innovative teaching practices arise. The first challenge comes from crossing the school-level. This study utilized principal responses to school autonomy as a predictor for teacher actions. While there is a theoretical basis to support this analysis, teachers' educational beliefs are a significant determinant in explaining why teachers adopt educational innovations in the classroom (Hermans et al., 2008). Similar to the findings of Le Donné and colleagues (2016), teacher's beliefs can be just as important to adoption as teacher characteristics such as computer experience, general computer attitudes, and gender. Though principals may have the autonomy, teachers are the ones enacting the practices. Therefore, teachers need to be involved in the process, which was demonstrated by the findings of research question one.

The second challenge comes from the principal's perception of authority. Principals may not feel they have the authority to make decisions and carry them out even if they are granted the autonomy in which to do so. A gap can then form between

the amount of autonomy a principal believes they possess and how much they actually have (Adamowski, Therriault, & Cavanna, 2007). This disconnect could explain the differing relationships between school autonomy and cognitive activation and enhanced activities. Teaching practices that utilize cognitive activation could be more aligned with what principals have seen in the past or can readily support. Though many students are not being exposed to these practices (OECD et al., 2014), practices such as differentiation and referring to problems from everyday life are more readily understood than ICT use, or projects that take at least a week. When principals are given the more autonomy, they may support teaching practices they are more familiar with. When school leaders feel as though they do have the authority to make decisions, then this autonomy can impact the teaching practice. It is possible for this impact on practice to be negative. When addressing instructional policies, principal autonomy can have a dampening impact on teachers' use of innovative teaching practices. This may be the case because when the principal is setting more of the instructional guidelines teachers are less likely to deviate from them. It is fair to consider that teachers are more likely to stray from curriculum to better meet their students' needs if the instructional policies are coming from a centralized entity as opposed to their building principal. This is an important distinction as Liu, Bellibas, and Printy (2018) found that increased levels of principal authority were a predictor of decreased involvement of staff, parents, and students.

Other Significant Predictors

One very interesting finding from this study was the impact some of the background variables had on both aspects of innovative teaching practices. For cognitive

activation, teacher gender, teacher experience, professional development needs for ICT skills for teaching, professional development needs for new technologies in workplaces, principal gender, principal experience, school type (public or private), and the percentage of students coming from disadvantaged homes were all significant predictors. Distributed leadership and school autonomy for staffing presented as the strongest predictors of cognitive activation across the study.

For enhanced activities, teacher gender, teacher experience, both of the professional development needs, principal gender, school type, and the school percentage of students coming from disadvantaged homes were significant predictors. The following sections will look at the role the background variables played for each component of innovative teaching strategies individually.

Cognitive activation. Teacher gender had a significant but negative impact on teachers' use of teaching practices that utilized cognitive activation. Since male teachers in the study were coded as one and female teachers in the study were coded as two, this finding shows that women teachers are significantly less likely to utilize cognitive activation strategies in their classrooms than their male counterparts. This finding is consistent with the meta-analysis conducted by Cai, Fan, and Du (2017), who found that male teachers still hold a more favorable attitude towards technology use than female teachers, though the difference has decreased in recent years. This finding necessitates further investigation, however, as there are a multitude of other factors that could be involved.

Teacher experience was a significant and positive predictor of the use of cognitive activation. As the survey item was coded as higher values for more years of experience, this finding indicates that as teacher experience increased, their use of activities that utilized cognitive activation also increased. That is to say, that teachers with more experience are more likely to utilize teaching strategies that focus on cognitive activation, such as differentiation in student work. It would also be interesting to gain a better understanding of this finding. What specifically within teacher experience allowed them to utilize these practices more frequently?

Teacher need for professional development in ICT skills for teaching was measured with increasing values indicating a higher level of teacher need. The significant negative estimate indicates that as teachers perceive their need for professional development in ICT skills for teaching to increase that their use of cognitive activation strategies decreases. This finding is intuitive for practices that require the use of ICT; however, this finding shows that teachers who feel as though they need more professional development around ICT use for teaching are using other innovative teaching practices less frequently as well.

Teacher needs for professional development for new technologies in workplaces were positive and significant. Since it was coded the exact same way as the need for professional development in ICT skills for teaching, it was intriguing to see the opposite direction of the relationship. This is to say, that as teachers perceived a higher need for professional development for new technologies in workplaces, their use of practices that utilized cognitive activation increased. Teachers' need for professional development for

new technologies in the workplace is yields an intriguing result. It shows that as teachers feel as though they need more professional development in the technologies associated with their day to day work that their use of practices that utilize cognitive activation increases significantly. This is especially interesting due to the opposite direction associated with the other professional development item.

Principal gender as a predictor of teachers' use of practices that utilized cognitive activation was negative and significant activation. This result is similar to the teacher finding mentioned earlier, where teacher gender had a significant negative impact on teachers' use of practices that utilized cognitive activation. Principal gender demonstrated a stronger relationship, however. It shows that teachers of principals who identified as female are less likely to utilize cognitive activation practices. This finding similar to the teacher results needs more information as there are a host of variables that could account for this.

Principal experience size as a predictor of teachers' use of practices that utilized cognitive activation was a significant positive predictor of cognitive activation. This means that as a principal gains experience then the teachers at their school are more likely to utilize cognitive activation practices. Intuitively, this makes sense as it is consistent with the teacher experience predictor, and principals with more experience may be able to better support their teachers.

School type was a negative predictor of cognitive activation from research question two. This result shows that teachers at private schools are more likely to utilize cognitive activation than their public school counterparts. This finding is interesting as

school type is a strong predictor in the school autonomy model for research question two, but not a significant predictor of the distributed leadership model for research question one. This result demonstrates the need for deeper investigation into why these practices are or are not taking place.

The final significant predictor of teachers' use of practices that utilize cognitive activation was the percentage of students coming from disadvantaged homes. The results of this variable were counterintuitive. Previous research on student success and its relationship with students' low socioeconomic status indicated that schools with a higher percentage of low socioeconomic status students typically have lower levels of achievement (Branch et al., 2012). The results of this study are not directly tied to achievement but do demonstrate that there is a significant and positive association between the percent of students coming from disadvantaged homes and teachers' use of practices that utilized cognitive activation. One rationale for this finding could be in line with the work of McLeod and Shareski (2018), in which they point out that schools can address issues of equity through innovative work. Teachers in schools with higher levels of students coming from disadvantaged homes may feel the need to utilize more innovative teaching practices to help their students be successful, as there is a positive association between innovation and equity in learning outcomes (OECD et al., 2014). OECD and colleagues (2014) further explained that innovative education systems often are more equitable for students as there is less variation within and across school-levels in these systems.

Enhanced activities. Similar to the findings from cognitive activation, teacher gender had a significant and negative impact on teachers' use of practices that utilized enhanced activities. This means that teachers who identified as female were less likely to utilize these practices in their classrooms. As mentioned by Cai et al. (2017), a teacher may have a positive view or belief about the results of the use of technology, but they may have a low level of self-efficacy about their ability in how to utilize it. In their study, this a low level of self-efficacy was the reason for the differences between male and female teachers. This finding necessitates further investigation as there could be other factors at play.

Teacher experience was a significant and positive predictor of teachers' use of practices that utilized enhanced activities. Another way of saying this would be that the more experience teachers have in the field, the more likely they are to use enhanced activities in their classrooms. This finding has a more intuitive understanding as teacher experience has been linked to how quickly they accept new technology (Scherer, Siddiq, & Tondeur, 2019). In their article Scherer et al. (2019) explain the Technology Acceptance Model (TAM) and how characteristics like age and experience enhance or hinder teachers' acceptance. This finding, similar to the positive relationship between teacher experience and cognitive activation, shows that experience is, however, a positive predictor.

Similar to cognitive activation, principal gender was a negative predictor of teachers' use of enhanced activities. The consistency between teaching practices is

important to note as it shows that gender does play a role, but it would be imperative to better understand some of the other factors at play with these results.

School type was a significant and positive predictor of teachers' use of enhanced activities. Similar to cognitive activation, this finding shows that private schools were more likely to utilize enhanced activities. The results of the study revealed that teachers in private schools were more likely to utilize these practices in their classrooms than their public-school counterparts. Chatterji (2018) explains that a reason for this can be in the acquisition of technology that can be used to enhance lessons. The author points out that private schools are involved in the active recruitment of students. This recruitment can then promote the purchasing of new technologies as an incentive to increase enrollment.

A final school variable that demonstrated a significant impact on teachers' use of practices that utilize enhanced activities was the school's percentage of students coming from disadvantaged homes. This finding was also similar to the cognitive activation finding that schools with higher proportions of students coming from disadvantaged homes were more likely to utilize enhanced activities. This consistency shows that schools with higher proportions of students coming from disadvantaged homes are intentionally utilizing these practices more so then their counterparts. Further investigation into this concept would be intriguing.

The results of the analysis also demonstrated opposing impacts of teachers' need for professional development. Teachers' need for ICT skills for teaching was a significant negative predictor, while teachers' need for professional development for new technologies in workplaces was a significant positive predictor. The opposing directions

are unanticipated, as mentioned before. However, the alignment across both types of innovative teaching practices demonstrates the consistency of the findings.

Limitations of the Study

There are three limitations to this study. First, the data for this study comes from a survey initially designed by the Teaching and Learning International Survey as part of the Organization for Economic Cooperation and Development (2013) survey of principals and teachers from across the world. The data was collected before the development of the study, which means that the research questions posed must rely on the specific questions derived from the initial survey. The researcher did not develop the survey, nor was he involved in its deployment or initial analysis. Thus, the selection of variables is less flexible.

Second, there is no way of knowing exactly how participants interpreted the questions and if they viewed the constructs as the researcher intended. This is a limitation of all survey self-report research. However, through factor analysis and measures of model fit, there is some support that participants were responding to question items as expected.

A final limitation of the study is that it is focused on the overall relationship between school autonomy and distributed leadership and teachers' use of innovative teaching practices, rather than on whether (and, if so, to what extent) the relationship varies between countries. The sample includes data from all 32 countries in the TALIS (2013). The analysis then is more descriptive and predictive than normative and prescriptive, and more internationally generalizable than internationally comparative.

This means that there are no comparisons between countries included in the analysis. Though, as a note to the use of international data, measurement invariance was explicitly tested to conduct cross-cultural analysis. For items to be selected, they must show that they are answered similarly across different educational locations. This means that if an item does not test similarly across countries, then it will not be included in the final TALIS (2013) results. The results of this analysis will act only as a baseline for future work.

Implications for Practice

Numerous studies have investigated innovation in education. One area of research has focused on how schools can develop future-ready students through innovative teaching practices (McLeod & Shareski, 2018). The shift towards innovative teaching practices stems from the criticisms aimed at traditional models of instruction. These traditional models tend to be more lecture-based (Ainely & Carstens, 2018) and are thought to impede teachers' abilities to utilize practices that are geared towards developing students who are prepared for their future (Hermans et al., 2008). The innovative teaching practices, as defined by OECD (2019), focus on developing students through a range of practices that get students to think, evaluate, collaborate, and build a variety of skills across the curriculum. These types of skills are difficult to develop in students when utilizing a lecture format (Ainely & Carstens, 2018).

The current study examined innovative teaching practices as the initial step in the progression of developing future-ready students. Through analyzing school autonomy and distributed leadership we can understand how these practices impact the frequency in

which teachers turn to the defined innovative practices and deviate from the norm. The next few paragraphs discuss the implications for practice based on the results of the analysis.

Distributed leadership for innovation. The findings of this study of international schools demonstrate the significant and positive impact of distributed leadership on teachers' use of both components of innovative educational practices. The invariance of items across countries shows that distributed leadership is a positive way for educational leaders in a vast array of settings to bolster teachers' use of innovative teaching practices in their classrooms. This means that those in formal decision-making roles should intentionally stretch the decision-making to include multiple informal stakeholders.

Another key for practice is the fact that a significant relationship between distributed leadership and innovative teaching practices exists, as distributed leadership was the strongest predictor in the study. That is to say, a definite link exists that shows when teachers are given the opportunity to make decisions and develop their own capacity, they utilize these opportunities by incorporating more innovative practices. This is a salient point because it exemplifies the basis of the study that when given the options, teachers want to use these strategies because they know their importance to their students' futures. Principals and anyone associated with educational decision-making interested in bolstering the use of innovative teaching practices should then focus on how teachers and other informal stakeholders can become more involved in the creation of curriculum and its delivery.

Beyond the school buildings, other stakeholders should utilize the findings of this study to better inform their practice. Some of these stakeholders include principal preparation programs, accrediting bodies, and professional development organizations. Principal preparation programs should look to the findings to help guide their curriculum development. Since distributed leadership as a philosophy of leadership encourages shared decision-making, it would make sense for preparation programs to not only introduce the theoretical components, but also model the behavior in their settings. These programs could seek to model these behaviors for their students to help them gain an understanding of how to incorporate them in the field.

From the accreditation perspective it is critical to understand how fostering distributed leadership can be included as part of the process. The positive and significant relationship that distributed leadership has on teachers demonstrates its importance to the field. If we want accredited principals to help guide and serve their teachers then a distributive approach seems like a very suitable approach.

Professional development organizations should also utilize the findings on distributed leadership. Principals who are in the field could use the support of professional development to help them better understand how and why they could employ a distributed leadership approach. Learning for principals does not stop once they have the job. Professional development organizations could support existing principals to help guide them towards developing future-ready students through the use of a distributed leadership philosophy.

School autonomy for innovation. The findings from this study also demonstrate that school autonomy for innovation is a significant predictor for cognitive activation. In schools where principals felt as though they had more autonomy with making budgeting and staffing decisions, the teachers were more likely to use practices that focused on cognitive activation. Based on this evidence, it would make sense for principals to advocate for their ability to have more autonomy in this realm of education. By allowing principals more autonomy to make budgeting decisions, they could then allow teachers time to focus on the pedagogical decisions being made in their classrooms.

The results of the study also demonstrated the negative relationship between school autonomy for instructional policies and both cognitive activation and enhanced activities. This study demonstrates that when principals gain more autonomy in instructional policies then their teachers are less likely to utilize innovative teaching strategies. This is an important result as it shows that not all autonomy for principals is beneficial for these intended outcomes. This shows the intricacies of autonomy and the importance of utilizing it intentionally. Educational leaders must purposefully make decisions around how to distribute autonomy for there to be results.

Professional development for innovation. One of the most intriguing results of the study was the impact of the two professional development items. For both outcome variables of cognitive activation and enhanced activities, teachers' need for ICT skills for teaching was the significant negative predictor. It is clear that for teachers to utilize these innovative practices in their classrooms that they feel as though they need more support. This finding demonstrates the importance teachers place on professional development

and their own self-efficacy with technology. Teachers then will not use these practices if they feel as though they are not prepared. The relationships indicate that not only principals but school leaders and those preparing teachers should spend a considerable amount of time on developing teachers who are future-ready. Teachers need the same skills that their students do in order to be successful in a field that is ever-changing. Teachers need to embrace innovative methods of learning to allow them to adapt and adjust to new modalities of teaching they will encounter in their careers.

Future Research

Future research on the study of innovation could be conducted in several intriguing ways. Due to the cross-sectional data used in this analysis, the findings can only be regarded as a piece of the whole story. Causal relationships cannot be developed from these types of analyses. Three specific directions for future research are outlined below. They include a recommendation for a study investigating the professional development items, a country by country comparison, and examining the development of 21st-century skills and future-ready students.

Professional development. As previously mentioned, one of the more interesting findings from the study was the impact of teachers' need for professional development on their use of innovative teaching practices. Future research could examine this finding in a few different ways. It would be interesting to find school systems that had a strong focus on professional development around ICT use and see if their teachers were then more likely to use these practices. It would also be interesting to see what exceptional professional development around ICT use and innovation looks like. This study limited

the scope to teachers' perceptions of the need for professional development, but it would be important to know what was offered in schools that were deemed exceptional, as well as investigating the professional development in schools where these innovative practices are regularly used to see if there are any connections.

Country by country comparison. In this study, the interest was in the overall effect of school autonomy and distributed leadership on teachers' use of innovative teaching practices rather than the relationship between countries. The data from all 32 countries were pooled together in the TALIS (2013) data set to make one sample. This made the analysis more descriptive and predictive than normative and prescriptive, which, in turn, made the results more internationally generalizable and less comparative. A comparison of countries that were thought to be outliers in their use of innovation in education could be accomplished by purposefully selecting countries from the data and comparing them at the country level as opposed to the school-level. This could be achieved by adding the country as a third level to the model. Research could also investigate single countries at a time and combine the results together to form a comparative index.

Examining the development of 21st-century skills and future-ready students. A final direction for future studies would be to examine the next steps in the progression of developing future-ready students. Based on the limited number of items in the TALIS (2013) survey, the initial step, innovative teaching practices were used for this study. Future studies could look into how schools specifically go about developing 21st-century

skills in students and if those schools demonstrate higher levels of distributed leadership than their counterparts.

A longitudinal study of distributed leadership and the development of future-ready students would also be an interesting direction for future research. The cross-sectional nature of this study does not allow for a timeline of effect. Researchers could use future TALIS studies to compare countries' current results to their results from 2013. This would allow researchers to look for policy implications and the impacts they had on the development of students. This type of study would also require a more solidified definition and example of a future-ready student. While this study does offer a theoretical definition, it would be intriguing to come to a consensus on a definition and then investigate where students defined by this term were most frequently coming from.

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Appendices

A. Mplus Input

MCFA Mplus Input for Distributed Leadership

```
DATA:
FILE is '/Users/coshea2/Desktop/TALIS DISSERTATION FINAL.dat;

VARIABLE:
  MISSING ARE ALL (-99);
  NAMES ARE IDSCHOOL IDTEACH CNTRY Gender TEXPER TDEGREE
  TNEED1 TNEED2 TT2G42A TT2G42B TT2G42C TT2G42D TT2G42E
  TT2G42F TT2G42G TT2G42H TT2G43D TT2G43E TT2G43F TT2G44A
  TT2G44B TT2G44C TT2G44D TT2G44E TCHWGT
  PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES PSTFFAUT
  PBDGTAUT PINSTAUT SCHWGT schid
  ;

usevariables are
TT2G44A TT2G44B TT2G44C TT2G44D TT2G44E;

 cluster= schid;
weight=  TCHWGT;
 bweight= SCHWGT;

analysis: type=twolevel;
         estimator=MLR;

model:

%within%
DL_W BY TT2G44A
        TT2G44B(a)
        TT2G44C(b)
        TT2G44D(c)
        TT2G44E(d)
       ;

DL_B BY TT2G44A
        TT2G44B(a)
        TT2G44C(b)
        TT2G44D(c)
        TT2G44E(d)
```

```
      ;
output: stdyx;
```

MCFA Mplus Input for Cognitive Activation

```
DATA:
FILE is '/Users/coshea2/Desktop/TALIS DISSERTATION FINAL.dat;

VARIABLE:
 MISSING ARE ALL (-99);
 NAMES ARE IDSCHOOL IDTEACH CNTRY Gender TEXPER TDEGREE
 TNEED1 TNEED2 TT2G42A TT2G42B TT2G42C TT2G42D TT2G42E
 TT2G42F TT2G42G TT2G42H TT2G43D TT2G43E TT2G43F TT2G44A
 TT2G44B TT2G44C TT2G44D TT2G44E TCHWGT
 PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES PSTFFAUT
 PBDGTAUT PINSTAUT SCHWGT schid
 ;

usevariables are

TT2G42C TT2G42D  TT2G43E TT2G43F;              !COGACT

 cluster= schid;
weight=  TCHWGT;
 bweight= SCHWGT;

analysis: type=twolevel;
        estimator=MLR;
model:

%within%

COGACT_W BY
          TT2G42C
          TT2G42D(b)
          TT2G43E(c)
          TT2G43F(d)
         ;

%between%

COGACT_B BY
         TT2G42C
         TT2G42D(b)
         TT2G43E(c)
```

```
          TT2G43F(d)
          ;
output: stdyx ;
```

MCFA Mplus Input for Enhanced Activities

```
DATA:
FILE is '/Users/coshea2/Desktop/TALIS DISSERTATION FINAL.dat;

VARIABLE:
  MISSING ARE ALL (-99);
  NAMES ARE IDSCHOOL IDTEACH CNTRY Gender TEXPER TDEGREE
  TNEED1 TNEED2 TT2G42A TT2G42B TT2G42C TT2G42D TT2G42E
  TT2G42F TT2G42G TT2G42H TT2G43D TT2G43E TT2G43F TT2G44A
  TT2G44B TT2G44C TT2G44D TT2G44E TCHWGT
  PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES PSTFFAUT
  PBDGTAUT PINSTAUT SCHWGT schid
  ;

usevariables are
TT2G42B TT2G42G TT2G42H;                                    !ENACT

 cluster= schid;
weight=  TCHWGT;
 bweight= SCHWGT;


analysis: type=twolevel;
        estimator=MLR;

model:

%within%

ENACT_W BY TT2G42B
        TT2G42G(e)
         TT2G42H(f)
         ;

%between%


ENACT_B BY TT2G42B
```

```
 TT2G42G(e)
 TT2G42H(f)
;

output: stdyx;
```

MSEM Research Question 1 Distributed Leadership Mplus Input

```
DATA:
FILE is '/Users/coshea2/Desktop/TALIS DISSERTATION FINAL.dat';

VARIABLE:
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  NAMES ARE IDSCHOOL IDTEACH CNTRY Gender TEXPER TDEGREE
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  TT2G42F TT2G42G TT2G42H TT2G43D TT2G43E TT2G43F TT2G44A
  TT2G44B TT2G44C TT2G44D TT2G44E TCHWGT
  PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES PSTFFAUT
  PBDGTAUT PINSTAUT SCHWGT schid
  ;

usevariables are
TT2G44A TT2G44B TT2G44C TT2G44D TT2G44E

Gender TEXPER TDEGREE TNEED1 TNEED2

PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES

TT2G42C TT2G42D  TT2G43E TT2G43F
TT2G42B TT2G42G TT2G42H;


 cluster= schid;
 BETWEEN ARE !PBDGTAUT PINSTAUT PSTFFAUT
 PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES;
 WITHIN ARE Gender TEXPER TDEGREE TNEED1 TNEED2;
 weight=  TCHWGT;
 bweight= SCHWGT;


analysis: type=twolevel;
        estimator=MLR;

model:
```

```
%within%
DL_W BY TT2G44A
      TT2G44B(a)
      TT2G44C(b)
      TT2G44D(c)
      TT2G44E(d)
      ;

COGACT_W BY TT2G42C
         TT2G42D(b)
         TT2G43E(c)
         TT2G43F(d)
         ;

ENACT_W BY TT2G42B
        TT2G42G(a)
        TT2G42H(b)
        ;
COGACT_W ENACT_W ON
Gender TEXPER TDEGREE TNEED1 TNEED2;

%between%
DL_B BY TT2G44A
      TT2G44B(a)
      TT2G44C(b)
      TT2G44D(c)
      TT2G44E(d)
      ;


COGACT_B BY TT2G42C
         TT2G42D(b)
         TT2G43E(c)
         TT2G43F(d)
         ;


ENACT_B BY TT2G42B
        TT2G42G(a)
        TT2G42H(b)
        ;
```

```
COGACT_B ENACT_B ON DL_B
PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES;


output: stdyx;
```

MSEM Research Question 2 School Autonomy Mplus Input

```
DATA:
FILE is '/Users/coshea2/Desktop/TALIS DISSERTATION FINAL.dat';

VARIABLE:
 MISSING ARE ALL (-99);
 NAMES ARE IDSCHOOL IDTEACH CNTRY Gender TEXPER TDEGREE
 TNEED1 TNEED2 TT2G42A TT2G42B TT2G42C TT2G42D TT2G42E
 TT2G42F TT2G42G TT2G42H TT2G43D TT2G43E TT2G43F TT2G44A
 TT2G44B TT2G44C TT2G44D TT2G44E TCHWGT
 PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES PSTFFAUT
 PBDGTAUT PINSTAUT SCHWGT schid
 ;

usevariables are

Gender TEXPER TDEGREE TNEED1 TNEED2

PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES
TT2G42C TT2G42D  TT2G43E TT2G43F
TT2G42B TT2G42G TT2G42H

PBDGTAUT PINSTAUT PSTFFAUT;


 cluster= schid;
 BETWEEN ARE PBDGTAUT PINSTAUT PSTFFAUT
 PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES;
 WITHIN ARE Gender TEXPER TDEGREE TNEED1 TNEED2;
 weight=  TCHWGT;
 bweight= SCHWGT;
```

```
analysis: type=twolevel;
        estimator=MLR;

model:


%within%
COGACT_W BY TT2G42C                         !TT2G42A
          TT2G42D(b)
          TT2G43E(c)
          TT2G43F(d)
          ;

ENACT_W BY TT2G42B
         TT2G42G(a)
         TT2G42H(b)
         ;
COGACT_W ENACT_W ON
Gender TEXPER TDEGREE TNEED1 TNEED2;

%between%

COGACT_B BY TT2G42C
          TT2G42D(b)
          TT2G43E(c)
          TT2G43F(d)
          ;


ENACT_B BY TT2G42B
         TT2G42G(a)
         TT2G42H(b)
         ;


COGACT_B ENACT_B ON
PBDGTAUT PINSTAUT PSTFFAUT
PGENDER PDEGREE PEXPER SCHSEC SCHSIZE SCHSES;


output: stdyx;
```