Coastal Carolina University

CCU Digital Commons

5-1-2023

Adaptability: Its Professional Capital and Influence on Secondary Science Teacher Job Satisfaction

Kristy A. Floyd
Coastal Carolina University

Recommended Citation

Adaptability: Its Professional Capital and Influence on

Secondary Science Teacher Job Satisfaction

by

Kristy A. Floyd

A dissertation submitted to the faculty of
Coastal Carolina University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Education

in

Curriculum, Instruction, and Assessment

Education Sciences and Organizations

Coastal Carolina University

May 2023

Coastal Carolina University Spadoni College of Education and Social Sciences

STATEMENT OF DISSERTATION APPROVAL

The dissertation of   **Kristy Floyd**

has been approved by the following supervisory committee members:

Suzanne Horn	, Chair	**March 22, 2023**
		Date Approved

Benjamin Parker	, Member	**March 22, 2023**
		Date Approved

Nicholas Pritchard	, Member	**March 22, 2023**
		Date Approved

and by   **Holly Tankersley**   , Chair/Dean of

the Department/College/School of   **Education and Social Sciences**

and by **J. Lee Brown**, Dean of The Graduate School.

DEDICATION

This dissertation is dedicated to the memory of one of the strongest and most determined women I have ever known, Rahnda Ford. Throughout the program, she and our third amigo, Teresa Gibbons, were steadfast in keeping our trio motivated and striving to be the best we could be. Rahnda never lost focus on achieving her degree and was committed to her goal in ways most of us can only dream of. For providing an endearing friendship, fierce teammate, and inspiring role model, this one is for you, Dr. Rahnda Ford.

This dissertation is also dedicated to the thousands of past and present students I have taught throughout my career. It is because of you that I continue to be dedicated to improving science education. I always want my students to have the opportunity to explore and discover science. I hope that the research from this study will spur conversations about how to keep our teachers in the classroom for your future, and ours.

Finally, this dissertation is dedicated to the memory of my Pa. You were always my biggest cheerleader and made sure everyone knew not to mess with me. I know you would have been so proud to see me achieve this long-awaited dream. You may not be here in person, but you are in my heart today, and always.

ABSTRACT

Following a 15-year decline, the United States is experiencing the lowest educator job satisfaction ever recorded amidst a critical teacher shortage. Discussions of how to retain teachers are part of everyday conversations in education. Although much research has been conducted on the many factors influencing job satisfaction, one factor that has yet to be thoroughly studied is teacher adaptability. Everyday challenges such as new curricula, policy changes, and the COVID-19 pandemic require teachers to be adaptable. This study analyzed the results of a teacher survey that examined the elements of professional capital to determine how they affected teacher adaptability and the resulting job satisfaction. The study specifically focused on secondary science teachers who are particularly vulnerable to attrition as they leave the profession earlier, more often, and in greater numbers than nearly all other grade levels or content areas. Results from the researcher-created online survey of over one-hundred teachers across the US revealed that social and decisional capital and administrative support had significant correlations with and were strong predictors of teacher adaptability and subsequent job satisfaction. Teachers reported that having opportunities for collaboration and instructional autonomy made them feel more confident in their abilities and more motivated to remain in the profession. These relationships provide potential ideas for reducing and minimizing teacher attrition, such as providing administrative support, creating opportunities for teacher collaboration, and allowing freedom of instructional autonomy. Building teachers' social and decisional capital supports a positive adaptive space where teachers grow professional capital and improve their adaptability. With some minor but consequential modifications to our professional practices, our school systems can keep more educators in the classroom, especially our secondary science teachers.

ACKNOWLEDGEMENTS

I would like to express my sincerest gratitude to my doctoral committee for your guidance, feedback, and suggestions throughout this process. To Dr. Nicholas Pritchard and Dr. Benjamin Parker, I greatly appreciate your input and background knowledge that helped ensure I was creating a dissertation to be proud of. To Dr. Suzanne Horn, your constant words of encouragement, repeated reviews of my work, and your lighthearted laughter have kept me sane and motivated throughout this arduous process. Your time and thoughtfulness will be forever appreciated.

I would also like to thank our education cohort members, especially my curriculum, instruction, and assessment ladies. Late-night text messages, early Saturday morning writing sessions, paper exchanges, and long walks discussing our dissertations have kept me on my timeline and provided invaluable advice and feedback throughout our entire program. I also greatly appreciate the never-ending barrage of motivational statements, positive news, and commiserating memes that helped push me through and keep me grounded during this journey.

I am eternally grateful to my parents for their love, encouragement, motivation, and pride in my accomplishments over the years that have led me to this achievement. Their belief in me and their emphasis on my education have always kept me striving to be more and do better.

Most of all, I want to express my greatest and deepest appreciation to my husband, Richard Floyd. I will never be able to thank you enough for the sacrifices you made, dishes you washed, laundry you folded, errands you ran, and the long walks where I babbled endlessly about multicollinearity and correlation, all so that I had opportunities to think, research, write, relax, and nap. You have provided an endless supply of motivation, encouragement, laughter, and candy that eased the stress and frustration that sometimes accompanied this process.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

Teacher shortages are a large and looming problem throughout the United States. Educator attrition rates range from 20-50% of teachers leaving the profession within the first five years (Hughes, 2012). Attrition in the 2017-18 school year contributed to a shortage of approximately 100,000 teachers (Garcia & Weiss, 2019). Although there are other factors, many teachers report a lack of job satisfaction when leaving the classroom. In a recent survey, the percentage of teachers stating they were 'very satisfied' with their job dropped to an all-time low of only 12% (Will, 2022). This low point follows a 15-year declining trend in teacher job satisfaction. The same study reported that 44% of the teachers surveyed stated they were likely to quit and leave the profession within the next two years. In recent years, teacher job satisfaction and retention have been commonly discussed in the media and the public education system. With the onset of the COVID-19 pandemic and fears of a growing teacher shortage, there is even greater concern about what can be done to address teachers' job satisfaction and keep educators in the classroom.

One group of teachers that is particularly vulnerable to high attrition is secondary science teachers. These teachers leave earlier in their careers and in greater numbers than all other groups other than special education and secondary math teachers (Quartz et al., 2008). Science teachers are 26% more likely to leave their schools within the first five years than non-science educators (Allen & Sims, 2017). Having advanced degrees, many science educators are teaching outside of their certified field. They lack the qualifications needed to teach the content, which can result in reduced self-efficacy and job satisfaction (Hobbs, 2013). Due to the need for certified science teachers, educators with science degrees often teach courses outside their immediate expertise. Courses such as marine biology or environmental science may be taught by teachers with a

chemistry or physics degree, resulting in feelings of inadequacy and ineffectiveness, thus lowering their self-efficacy.

Without the prior knowledge and necessary background for teaching science content outside of their degree field, these educators are often given less autonomy and have lower degrees of adaptability (Behr, 2021). Administrators maintain greater control over the instruction of these science teachers based on their lack of background in the specific course content. The increased management of teacher instruction results in a lack of adaptive space and adaptability, potentially lowering job satisfaction and leading to educators leaving the classroom. Having advanced degrees, science teachers can often find higher-paying jobs outside the classroom, providing further incentive for leaving the profession (Tai et al., 2007). Supporting teacher self-efficacy and improving job satisfaction for science educators is particularly critical in retaining these teachers.

A teacher's adaptability, instructional autonomy, and self-efficacy are linked to job satisfaction. Although this study focused on adaptability, instructional autonomy and teacher self-efficacy are so intricately connected within professional capital, one cannot truly understand adaptability without exploring these factors. Teachers who can positively adapt to change have a perceived sense of instructional autonomy, and educators with an elevated level of self-efficacy have been individually linked to greater degrees of job satisfaction (Aldridge & Fraser, 2016; Ng et al., 2022; Onyeukwu, 2022). A recent survey showed that few teachers feel they have professional autonomy. Only 34% of teachers reported having control over student assessment, while only 24% felt they had control over the curriculum (Will, 2022). Surveyed teachers felt they had the least autonomy over school policies, with only 5% selecting "strongly agree" to the

survey in that category. This lack of perceived autonomy can lead to increased job dissatisfaction.

Job satisfaction is further associated with student achievement and teacher retention. Teachers reporting greater job satisfaction have increased levels of student achievement and higher retention rates (Nordick, 2017; Yoon & Kim, 2022). Job satisfaction keeps teachers motivated and committed to the workplace and creates a strong resource-reward balance (Melesse & Belay, 2022). Each of these factors contributes to the academic performance and success of students. Teachers with greater job satisfaction also tend to remain in the profession longer, improving retention rates (Hughes, 2012). With teacher attrition and job satisfaction at all-time lows, school systems and administrators desperately need to identify and monitor the factors that can positively impact teachers' adaptive space. This need is particularly critical for secondary teachers with their higher attrition rate and greater academic qualifications. This study aimed to reveal the relationship between teacher adaptability and job satisfaction to support the improvement of teacher self-efficacy and retention.

Problem Statement

This study highlighted job satisfaction's external and internal impactors, focusing on teacher adaptability. This study intended to show the relationship between teacher adaptability and job satisfaction by exploring the factors influencing adaptive space. The pathway from teacher adaptability to job satisfaction depends on several factors, including teacher knowledge, administrative support, and the appropriate adaptive space (Parsons et al., 2016, 2018). Each of these factors is implicitly examined within the structure of professional capital. Professional capital indicates a teacher's sense of value or worth to the organization and is subdivided into three categories: human, social, and decisional capital (Hargreaves & Fullan, 2013). Human

capital consists of the skills, knowledge, and experience teachers bring to their profession, social capital is the collaborative power of teachers and the degree of administrative support, and decisional capital is the ability of teachers to make effective professional judgments (Hargreaves & Fullan, 2013; Solly, 2018). Adaptive space is also impacted by external factors, including local, state, and federal policies, administrative leadership, professional development, and resources (Aldridge & Fraser, 2016; Ng et al., 2022; Wang et al., 2019; Yoon & Kim, 2022). The interactions between these and many other factors create a complex system within education. The tenets of complexity theory were used to explain the current research literature and analyze this study's findings.

This study sought to analyze the relationship between teacher adaptability and job satisfaction. By figuring out which factors influence teacher retention and how these factors can be impacted, the public education system can increase job satisfaction and reduce teacher attrition. Given their high attrition rate, secondary science teachers were the focus of this study. The results of this study support future research in connecting job satisfaction with student performance and teacher retention, improving administrative support and professional development to build professional capital, and supporting teacher mentoring.

The purpose of this study was to determine the relationship between teacher adaptability and secondary science teachers' job satisfaction. The questions that were addressed in this study are:

1. What are the components of professional capital that influence teacher adaptability?

2. How does teacher adaptability influence secondary science teachers' job satisfaction?

Nature of the Study

This study employed quantitative multiple linear regression analysis to examine the relationship between teacher adaptability and job satisfaction. In particular, the study targeted

factors of professional capital that influence adaptability and the resulting impact on job

satisfaction. Due to their lower retention rates and greater opportunities for employment outside

the classroom, this study focused specifically on secondary science teachers' job satisfaction

(Quartz et al., 2008). Since education is a complex system and the constructs behind the need for

teacher adaptability are constantly changing, this study was conducted within the framework of

complexity theory.

The instrument used in this study was a survey that utilized statements adapted from

previously validated assessment tools that are reliable in indicating autonomy, adaptability, self-

efficacy, and job satisfaction. The study targeted participants who met the criteria of being

middle or high school science teachers in a public-school setting for at least five years.

Demographic questions at the beginning of the survey enabled me to select teachers who fit the

criteria. The survey instrument provided information on teachers' adaptability with classroom

instruction, leadership, and colleagues. The statements were divided into the following

categories: professional experience, adaptive space, and administrative support. Statements about

self-efficacy and job satisfaction provided information about potential connections to teacher

adaptability. Finally, open-ended questions allowed participants to add clarification and

examples that were used to triangulate the results.

Theoretical Framework

The theoretical framework used in this study was complexity theory. One of this theory's

major tenets is understanding complex systems' unpredictability, interconnectedness, and non-

linear nature (Deogratias, 2018; Morrison, 2006). With constantly changing internal and external

environments, schools and their stakeholders are part of an open and complex adaptive system.

Complexity theory is "a theory of change, evolution, and adaptation, often in the interests of

survival, and often through a combination of cooperation and competition" (Morrison, p. 1, 2006). Whether it is the expected annual staff and student turnover, or the more unpredictable modifications to curriculum programs and technology, these changes make significant impacts on the complex system that is education. As these changes occur, teachers are expected to adapt and modify their practice to meet new policies, standards of instruction, or professional behaviors. This transformation stimulates more change within the system, triggering added changes for teachers. Complexity theory attempts to explain the iterative cycle of change between the individuals of the system and the system itself (Mason, 2008; Morrison, 2006).

Within the construct of complexity theory, there are enabling conditions that support the intricate structure of complex systems and inhibitors which are detrimental to the functioning of the system and the individuals of which it is comprised. Increasing teachers' professional capital, providing quality professional development, and improving teacher self-efficacy have all been documented to support the educational system's complexity (McMurtry, 2009; Melesse & Belay, 2022; Morrison, 2006). Although they can be challenging to change, supportive school leadership and effective staff development promote the self-organizing side of complex systems (McMurtry, 2009; Morrison, 2006). Depending on their success, some of the enabling factors of complexity can also be considered inhibitors. Self-organization can lead to disconnected networks, individualized goals, and misdirected use of time and energy (Morrison, 2006).

Complexity theory supports the idea that given freedom with support, the components of a system will survive, evolve, develop, and adapt to make the individuals and the system more successful (Mason, 2008; Morrison, 2002). The focus of the complex system is on the big picture rather than the minute details. Failure of one area of the system can lead to a cascading failure of the interconnected elements of a complex system, such as education (Wernli et al., 2021). Thus,

careful monitoring and intervention are needed at all levels to maintain and support connectivity between the system's parts.

Complexity theory was a logical fit for this study because of the intricate nature of the teaching profession. The complex network of teachers, school staff, administrative leadership, district policies, legal mandates, student interactions, and curriculum is rife with ever-changing rules, regulations, and expectations. The system's ability to adapt and survive is dependent on the individuals who make up the system being able to do the same and vice versa. By analyzing teachers' adaptability, complexity theory provides a framework for explaining how this factor can influence teachers' ability to evolve and survive within the profession, as indicated by their job satisfaction.

Operational Definitions

The following list of terms is intended to assist the reader in understanding the terminology used in this study as interpreted by the researcher.

Instructional autonomy. A teacher's instructional autonomy is defined as their ability to make their own decisions about the methods of instruction for their classroom, including what they teach and how they teach it (Kim et al., 2008).

Adaptive space. The "relational, emotional, and sometimes physical space necessary for people to freely explore, exchange, and debate ideas" (Arena, 2022, p. 1).

Teacher adaptability. The ability to respond effectively to changes in job and classroom responsibilities, including instructional materials, classroom schedules, and student needs (Collie & Martin, 2017).

Self-efficacy. Confidence in one's ability to provide quality instruction and increase student achievement (Gkolia et al., 2014)

Collective efficacy. A group's shared belief in its combined abilities to organize and implement the actions necessary to reach specific goals (Bandura, 1997; Goddard & Salloum, 2011)

Job satisfaction. "The feeling of pleasure and achievement that you experience in your job when you know that your work is worth doing, or the degree to which your work gives you this feeling" (Cambridge University Press, 2022).

Complexity theory. Complexity theory attempts to explain the "relationship and interconnectedness" of individuals with each other and the system itself (Jones, 2013, p. 815). According to The Handbook of Educational Theories, complexity theory, as viewed through an educational lens, is the idea that learning communities are complex systems in which self-organized, interconnected individuals adapt and change together (Jones, 2013). These learning communities "rely on a constant supply of new information that becomes the driving force of learning, change, and thus the adaptation of individual members of the organization" (Jones, 2013, p. 818).

Professional capital. A collective value or worth comprised of three types of capital: human, social, and decisional capital (Hargreaves & Fullan, 2013).

1. *Human capital* – The talent, skills, knowledge, and experience of the individual teachers that are valuable to the school organization (Hargreaves & Fullan, 2013; Solly, 2018).

2. *Social capital* – The teachers' collaborative power and supportive culture within a school (Hargreaves & Fullan, 2013; Solly, 2018).

3. *Decisional capital* – The teachers' capability, wisdom, and expertise to make effective judgments associated with their profession (Hargreaves & Fullan, 2013; Solly, 2018).

Scope, Assumptions, Limitations, and Delimitations

Scope of the Study

This study focused on teacher adaptability's influence on secondary science teachers' job satisfaction. Given the impacts of educational policies, school leadership, and the recent pandemic, teacher shortages have reached a critical stage in the United States. Analyzing teacher adaptability's role in job satisfaction could provide potential solutions to this educational crisis. If job satisfaction can be improved by addressing teachers' adaptive space and individual adaptability, then instructional leadership and educational policies can be changed to tackle these issues. The predictor variable in this study was teacher adaptability, as defined by an educator's ability to respond effectively to changes in job and classroom responsibilities, including instructional materials, classroom schedules, and student needs (Collie & Martin, 2017). However, the data were collected and analyzed based on the elements of professional capital within teacher adaptability. Therefore, the multiple regression analysis was conducted based on survey data indicating human, social, and decisional capital. The outcome variable in this study was job satisfaction which is defined as "The feeling of pleasure and achievement that you experience in your job when you know that your work is worth doing, or the degree to which your work gives you this feeling" (Cambridge University Press, 2022).

Data were collected from December 2022 – January 2023 through private Facebook forums whose members are teachers in the United States. A survey was posted in the following online educator forums on Facebook: Teachers Ask Teachers (196k members); Science Teachers (22k members); Middle School Science Teachers Unite (15k members); Teachers Who Love Science (18k members); Middle School Science Teachers (23k members). According to the rules and regulations of these public and private forums, educational research surveys are permitted between group members. Members were asked to complete the survey based on the research

questions, and the sample was selected from those providing the specific criteria designated by this study. The sample included currently employed teachers in public schools within the United States who have taught at least five years in secondary science education. While data from participants outside the criteria were collected, they were not included in the analysis of the study. Descriptive statistics narrowed the sample by eliminating potential outliers that may skew the data. A test for multicollinearity was conducted to account for any covariates or confounders that could indicate false correlations between the variables. Using linear regression, data from the survey were analyzed to determine the relationship between this study's independent (predictor) and dependent (outcome) variables.

By analyzing the data given by the participants, the goal of this study was to answer the research questions:

1. What are the components of professional capital that impact teacher adaptability?

2. How does teacher adaptability influence secondary science teachers' job satisfaction?

Assumptions

There were a few assumptions to consider for this study. The primary assumption was that participants would honestly answer the survey demographics and focus statements. To support this assumption, participant identities were concealed, and their confidentiality was preserved. These measures improve the likelihood that participants would respond honestly to the survey statements. There was also the assumption that the participants would read the directions and understand the statements and terms used in the survey. The researcher's contact information was supplied if participants had questions or needed additional clarification. The final assumption was that the participants were willing to participate in the survey. No monetary or other incentives were provided; participants could decline or stop participation anytime.

Other assumptions to be considered in this study were associated with the multiple regression data analysis. Regression analysis assumes a normal distribution of the variables, which is not always the case (Keith, 2019; Osborne & Waters, 2002). Frequency distributions were used to find potential outliers that may impact the results. Another assumption of multiple regression is that the relationship between the predictor and outcome variables is linear (Field, 2018). Although this is often the case, there are many instances in which the relationship between the predictor and outcome variables is nonlinear. Therefore, it is essential to examine the data carefully or risk underestimating the true relationship between the variables. A third critical error often made in multiple regression studies is the assumption of homoscedasticity (Keith, 2019). This means that the variance is the same across all levels of the predictor variable. Making this assumption can lead to a distortion of the findings and weaken the overall data analysis. Evaluating scatterplots of the standardized errors with the predicted value helps check this assumption.

Limitations

Several limitations were considered when collecting and analyzing the data for this study. Given the intricate nature of the variables of this study and the diverse impacts on job satisfaction, several covariates and confounders could influence the results. Numerous studies have been conducted on different variables that influence job satisfaction. Some of these variables included official policies, salary, age, number of years of employment, workload, school climate, communication, intrinsic motivation, and commitment (Aldridge & Fraser, 2016; Imam et al., 2020; Melesse & Belay, 2022; Wangari & Orodho, 2014; Wong & Heng, 2009; Yoon & Kim, 2022). While these covariates may influence a teacher's sense of job satisfaction, this study's survey statements only focused on the relationship between teacher adaptability and

job satisfaction within the construct of professional capital. In addition, the predictor and outcome variables could be influenced by internal and external factors that may not be identified and could not be controlled for this study.

Since this study had multiple factors influencing the predictor variable, the survey was organized into sections to account for the effects of professional capital, such as administrative support, teacher knowledge and experience, self-efficacy, and adaptive space on teacher adaptability. This limited the amount of data that could be collected on each factor but may generate a more complete picture of the possible correlation between the predictor and outcome variables. Another limitation of this study was that the regression data analysis would reveal potential correlations between variables but not indicate direct causation. Data analysis revealed the degree of correlation and the elimination of potential covariates using a multicollinearity test. However, the direct cause and effect between the predictor and outcome variables could not be determined. The results of this study were limited to the reliability and validity of the survey and data analysis.

The survey for this study was limited to online participants who are members of public and private Facebook groups comprised of science teachers. This sample may have certain predispositions based on the fact that they share the same social media group. Participants were also limited to emailing the researcher if they had questions or needed clarification of any survey terms or directions. Limiting the sample to secondary science teachers may restrict the ability to generalize the results to other content areas or grade levels. However, most survey statements were not explicitly connected to either; hence, there is still the potential for the results to be used for the broader population of educators or to stimulate additional studies for different samples.

Using a quantitative survey, the participant's responses were indicated by a Likert scale, limiting the type and depth of information that can be collected. However, each section had open-ended questions so participants could provide additional information or clarification to support or enhance the quantitative results. An online quantitative survey was chosen for data collection for several reasons. Primarily, this method was selected because of its ability to collect copious amounts of data in a brief period. Additionally, the online forums were chosen because of the readiness of availability and lack of restrictions for access. The forums also supplied a large and diverse sample size to provide more accurate and valid data for analysis which can be transferrable to other teacher populations for future studies.

Delimitations

Due to the vast number of potential covariates for this study, the data collection and analysis only focused on the elements of professional capital that influence teacher adaptability and adaptability's influence on job satisfaction. Only survey results from secondary science teachers teaching in the field for at least five years were analyzed. According to the research, secondary science teachers experience higher attrition rates leaving more vacancies than in other content fields (Quartz et al., 2008). Therefore, this study was restricted to data collected from secondary science teachers. This study did not examine other grade levels or content areas or analyze data from educators teaching secondary science for less than five years. The choice to eliminate educators who have been teaching less than five years was based on the fact that newer teachers may be impacted by factors that could influence their adaptability or job satisfaction that may no longer be a factor for veteran teachers, such as new teacher training or professional development, learning the trade, teacher evaluations, being mentored, and lack of experience (Chapman & Elbaum, 2021; Melesse & Belay, 2022). By focusing on more experienced

teachers, this study was designed to minimize the number of covariates and outside influences on the data.

This study's original topic and research questions included the analysis of the relationship between instructional autonomy and teacher adaptability and the influence of both on job satisfaction. However, after researching the concept of adaptive space, it was evident that instructional autonomy was one element of the adaptive space necessary for teacher adaptability. Therefore, it was decided to incorporate it into the factors that create and promote adaptive space instead of using it as a separate predictor variable. Modifying the research questions also resulted in minor changes to the survey statements and how they were organized. Except for the optional open-response questions on the survey, the data for this study was quantitative. Due to the need for a large sample size and time restrictions, qualitative data collected was not analyzed for this study.

Significance of the Study

With such a dire concern over educator retention, the results of this study could change how school districts recruit and retain teachers. If school systems could better understand why teachers are leaving, they could be better equipped to address and correct issues that prevent teachers from quitting. By focusing on the factors that potentially impact job satisfaction, this study revealed implications for practical solutions and strategies for improving external factors such as school climate, leadership, professional development, and instructional resources. The results also provided clues on how to increase professional capital by improving the internal factors of teacher adaptability. For example, studies have revealed that teachers need increased autonomy and control of their work environment (Pearson & Hall, 1993). There has also been evidence that with higher levels of efficacy, teachers have greater adaptability and are more

amenable to change (Mason, 2008). Understanding the impacts of adaptability, autonomy, and self-efficacy on job satisfaction provides opportunities for leadership to make positive changes that can improve teacher retention.

While this study focused on secondary science teachers and emphasized the role of adaptability in job satisfaction, the web of influence for these factors is potentially much greater. In addition to improving teacher attrition, the internal factors of adaptability, such as autonomy and self-efficacy, have also been tied to student achievement (Kim & Seo, 2018). Studies have shown that schools with greater teacher autonomy positively affect students' academic performance and teacher job satisfaction (Yolcu & Akar-Vural, 2020). By revealing connections between adaptive space and job satisfaction, schools can create conditions conducive to autonomous instruction and improved student performance. With administrative support, individual teacher self-efficacy can result in improved collective efficacy. A school's collective efficacy has also been reported to have a strong positive relationship with students' academic achievement (Ng et al., 2022). By evaluating teachers' self-efficacy and understanding how it can be improved, school leaders can improve their school's collective efficacy and student achievement.

The complex interconnectedness of the teaching profession makes it nearly impossible to analyze adaptability's influence on job satisfaction without considering the abovementioned factors. Through the lens of complexity theory, the outcomes of this study initiated ideas for strategies and professional development that might increase teacher adaptability and professional capital and improve job satisfaction. Future studies could investigate potential connections between self-efficacy and job satisfaction and their influence on student achievement and teacher

retention. The results of this study could also support future research and practice in improving administrative support and professional development for teachers.

Conclusion

Teacher retention continues to be a problem in today's public education system. This is particularly true when examining the number of secondary science teachers leaving the classroom and the profession. Multiple studies show strong positive relationships between job satisfaction and teacher retention, indicating the need to explore the possible factors influencing job satisfaction. Teachers' professional capital and adaptability may be critical in improving an educator's job satisfaction. The literature review delves into the distinct factors of professional capital that create a teacher's adaptive space and the resulting connection to teacher adaptability.

A survey was conducted to collect data on the teacher's adaptive space in the form of human, social, and decisional capital. Data was collected from secondary science teachers on public and private social media forums. Due to their intricate relationships, the chain of influence from professional capital to adaptability to teacher efficacy to job satisfaction was examined through prior research studies and compared to the results of this study. Multiple regression analysis was conducted to analyze any potential relationship between these factors and teacher job satisfaction.

Chapter 2: Review of Literature

Introduction

In school districts throughout the United States, the rate of teacher turnover is rising. Educator vacancies are prominent in the high-demand fields of special education, mathematics, and secondary science. Secondary science teachers leave the profession earlier, more frequently, and in greater numbers than any other subject area except mathematics and special education (Quartz et al., 2008; Tai et al., 2007; Wan et al., 2021). Consequently, the public-school system must discover means of retaining teachers longer. Multiple studies have indicated that increasing teacher retention can be achieved through enhancing job satisfaction (Aldridge & Fraser, 2016; Wong & Heng, 2009; Worth & Van den Brande, 2020; Yoon & Kim, 2022). Numerous external and internal factors, such as administrative leadership and support, remuneration, and teacher knowledge and skills, can influence job satisfaction (Aldridge & Fraser, 2016; Wong & Heng, 2009). Job dissatisfaction might limit teacher cooperation, retention, and student progress (Collie et al., 2020; Nordick, 2017). Consequently, identifying and supporting the elements that positively influence job satisfaction is essential for boosting the retention of secondary science teachers.

The recent COVID-19 outbreak emphasized the significance of adaptation in the teaching profession. Nevertheless, even without a catastrophic incident, teachers face everyday shifts and disruptions that require them to adapt. Having adequate adaptability skills may impact teacher job satisfaction and further influence the retention of secondary science teachers (Park & Johnson, 2019). Professional capital provides the structure and boundaries of a teacher's adaptive space. The human, social, and decisional capital constituting professional capital are variable and subject to rapid change based on a teacher's status and circumstances (Glazer, 2018). Education

is a vast and intricately interwoven system influenced by professional capital and a constantly changing educational environment.

The literature review explores how professional capital and adaptability are connected to the enabling circumstances and impediments of complex systems. The complexity theory paradigm is the foundation for this literature review's analysis of teacher adaptability. This chapter further describes the potential complexity theory implications of teacher adaptability and job satisfaction. The remaining literature describes the multiple regression theory and how this data analysis suits the study.

Complexity Theory Framework

The education system and the individual schools within them are extraordinarily complex and have many intricate, interdependent elements. As with any system of interconnected parts, many others can also be impacted if one facet of the system is affected. Whether it is a minor curriculum modification, a new principal, or a pandemic, when change occurs in a school system, all stakeholders are affected somehow. When there are changes within a system, a natural sequence of evolution and adaptations is necessary for the system to survive (Morrison, 2006). This sequence of change, evolution, and adaptation is the foundation of complexity theory. Complexity theory provides a framework for examining the challenges and opportunities of teaching (Martin et al., 2019). Teachers are constantly pressured to adapt to changes in their daily schedules, instructional plans, student behaviors, and many other variables. Teachers need effective adaptability skills and adaptive space to evolve their behaviors and practices to fit the constructs of the new circumstances. According to complexity theory, changes in the school environment create changes in teachers and their instruction (Morrison, 2006). To survive change, teachers must evolve by developing new adaptations to their changing environment

(Mason, 2008). The changes teachers make further result in changes in the school climate, creating an iterative process of change, evolution, and adaptation between teachers and the school environment. Complexity theory allows for a nonlinear analysis of how education functions as a complex system (Martin et al., 2019).

Complexity theory provides an explanation and understanding of how systems and organizations grow, adapt, and evolve (Gilead & Dishon, 2021). Organisms in a system respond to changes in their environment which in turn changes them, creating an iteration of dynamic internal and external changes (Morrison, 2006). All systems and their parts, in this case, schools and their staff, must meet the demands of change to adapt and evolve to be successful. In his book *Adaptive Space*, Arena (2018) describes the world as experiencing a tremendous transformation to which we must learn to adapt. He states that although we may not have the skills or experience at the moment, we must reinvent ourselves and change the structure of our organization, or else it will be disrupted. Complexity, not simplicity, provides this pathway for change.

"Natural evolution favours complexity" (Rzevski, 2019, p. 38). In his article on complexity in nature, Rzevski states that organizations should be designed to adapt to changes, not resist them. People often seek simplicity, so striving for a complex system may seem paradoxical. However, only complex systems have the interconnectedness, resilience, and adaptive behaviors to survive (Arena, 2018; Rzevski, 2019). Organizational complexity involves many components, or agents, which are interconnected and interactive in unique ways (Gilead & Dishon, 2021; Mason, 2008). These agents have unclear boundaries, are sensitive to external influences, and possess autonomy limited by system constraints (Gilead & Dishon, 2021;

Rzevski, 2019). Ergo, the degree of complexity within a school system depends upon its teachers' connectivity and autonomy.

Complex systems are also decentralized and self-organizing, resulting in nonlinear organization with distributed control in which the agents are interwoven and mutually dependent (Deogratias, 2018; McMurtry, 2009). The dynamic nature of complex organizations results in "co-evolving multilayer networks" whose behavior and operations depend on the intricate interaction of their agents (Wernli et al., 2021, p. 1). Using an education system lens, these co-evolving networks would include teacher collaboration, staff development, curriculum changes, and administrative support. Each of these elements requires regular cycles of change, evolution, and adaptation to support and improve the education system (Morrison, 2006). Teacher collaboration and interaction can result in positive co-adaptation and coevolution, improving the system's complexity. Providing opportunities for teacher autonomy and leadership contributes to the decentralized and distributed control that supports complex systems (Mason, 2008).

Unlike random or deterministic systems, complex systems are unbalanced with predictable uncertainty, emergent behavior, and self-organizing autonomous agents guided by norms, rules, and laws that provide opportunities for adaptation and evolution of the individuals and the system (Deogratias, 2018; Rzevski, 2019). This mosaic of features creates the dynamic self-governing interconnectedness of a thriving complex organization that adapts to and eliminates undesirable disruptions and changes. Adaptive space enables system agents to be positively disruptive and autonomous in their decision-making, resulting in stronger networks (Arena, 2018). A successful complex system aims to create an adaptive autonomous network that can manage the knowledge and skills necessary to tackle organizational challenges. This goal can be met by adhering to the seven key properties of complexity: connectivity, autonomy,

emergence, nonequilibrium, nonlinearity, self-organization, and co-evolution (Rzevski, 2019). Many of these properties are inherent in elements of professional capital.

One element of professional capital, decisional capital, is steeped in agent autonomy limited by organizational rules and regulations. The autonomy in an adaptive space encourages agents to engage in creative interactions within and outside the network to increase the system's interconnectivity (Arena, 2022). Thus, system complexity positively correlates with agent autonomy (Rzevski, 2019). Increasing decisional capital within an adaptive space promotes the self-organization of complex systems and supports the professional capital of its agents (Morrison, 2006). Several other properties of complexity build upon the social capital of the agents. Complex systems are self-organizing and can adapt the organization's structure in response to internal and external disruptions (McMurtry, 2009). The system's open nature allows for mutual and recurring interactions that can change the system and its agents. These interactions can lead to the emergence of new behaviors and more comprehensive connectivity within the system (Rzevski, 2019).

While the strength of complexity within an organization is dependent on the interconnectedness of its agents, there are individual roles that can also promote the success of the entire system. While adapting to environmental changes, the co-evolution of complex systems occurs due to their agents' self-organization, emergent behaviors, and connectivity (Deogratias, 2018; Gilead & Dishon, 2021). Each of these elements improves and promotes social capital within the organization by increasing the collective power of the system (Solly, 2018).

In his book *Adaptive Space*, Arena (2018) breaks down the organizational success of big companies by analyzing their adaptability to change and their employees' adaptive space.

Although he does not focus on education, his theories of how complex systems achieve success can be used to describe and explain the intricate nature of the public education system. Arena discusses the connectors and challengers who build relationships within the system and provoke change by encouraging innovative ideas. Connectors are vital to a system because they nurture relationships that support redundant connections, thus creating the complexity that allows for the successful adaptation to change. The web of influence developed and nurtured by the connectors is supported by teachers' human and social capital (Fullan, 2016). Connectors use their relationships to promote and cultivate innovative ideas, harvest teacher expertise, and foster social cohesion that facilitates the evolution of a complex system (Arena, 2018). By supporting their human and social capital, teachers develop the knowledge, skills, and relationships to build the connections needed to support a complex and adaptable system. This makes educators more adaptable to change as individuals (Voigt, 2021).

Challengers, on the other hand, intentionally provoke disruptions of the system to ignite and infuse change. These individuals see the need to break barriers and engage in current ideas to bring forth positive change. Instructional autonomy provided by decisional capital gives teachers the opportunity and ability to play the challenger role (Melesse & Belay, 2022). Their human capital provides teachers with the necessary knowledge to present new innovative ideas for change (Hargreaves & Fullan, 2013). Challengers look for long-range rather than short-term goals that stimulate the adaptations needed for a complex system to evolve (Arena, 2018). To succeed in the system, challengers must be given the human and decisional capital necessary to promote and implement positive change.

Rzevski (2019) claims that agents within a complex system are interconnected to negotiate outcomes from frequent operational disruptions. Agent interactions support the

distribution of decision-making and replace centralized control with teamwork. Arena (2018) mentions three types of interactions that lead to positive change; discovery interactions that stimulate innovative ideas, development interactions with teams that promote collaboration, diffusion interactions that expand concepts across the organization, and disruption interactions that facilitate overcoming the effects of formal structure within the system. These interactions encompass the professional capital of the system's agents that allow for adaptability.

Human capital is supported by allowing agents to experiment with innovative ideas and exploring alternative solutions, social capital is supported by collaboration and utilization of adaptive strategies within the system, and decisional capital is supported by the autonomous nature of the interactions themselves (Arena, 2018; Deogratias, 2018; Rzevski, 2019). Unlike rigid, highly controlled organizations, complex systems can adapt to and eliminate the negative results of system disruptions by improving their agents' professional capital. Decentralizing control can also give teachers more autonomous decision-making in their classroom instruction and more opportunities for collaboration to solve problems that arise from system disruptions.

Schools must meet the changes of the greater society. When changes occur in education, the immediate reaction is often to add restrictions, increase control, and limit teacher options (Melesse & Belay, 2022). However, complexity theory promotes just the opposite. By lifting restrictions, teachers can initiate new ideas and collaborate to solve problems (Rzevski, 2019). Without adaptive space and professional capital, the complexity of the system, and therefore its probability of success, is minimized. As new standards, technologies, programs, instructional programs, and staffing change, schools must be prepared to adapt and evolve, lest they become extinct.

Enabling Conditions and Inhibitors

According to complexity theory, there are enabling conditions and inhibitors for adapting to change. Self-efficacy is one of the critical factors enabling the ability to adapt to change (Mason, 2008). Teachers with positive self-efficacy have greater decisional capital, meaning they can make sound judgments during stress and change (Melesse & Belay, 2022). Decisional capital allows teachers to use their knowledge and resources to make informed decisions in new and unfamiliar situations. Good adaptability skills and a powerful sense of autonomy support decisional capital, leading to positive self-efficacy and job satisfaction.

Self-organizing agents also support complex systems (Morrison, 2006). Self-organization of the school system can emerge from the decentralized, bottom-up interactions and leadership of teachers and staff (McMurtry, 2009). The ability to self-organize is a direct result of the teachers' level of autonomy and decisional capital (Hargreaves & Fullan, 2013). By providing teachers with the knowledge and resources necessary to make wise and informed decisions, schools promote decisional capital and the ability for self-organization (Melesse & Belay, 2022). Administrators and school leaders must create an environment for change through self-organization rather than one with specific, detailed processes that can limit teachers' decisional capital (Morrison, 2006). By focusing on the big picture and end goals rather than the daily minutiae and tiny details, teachers can collaborate and use their professional capital to adapt effectively to change.

Just as several enabling conditions need to be present for a system to adapt to change successfully, many inhibitors can hinder or prevent effective change. Teachers must have a certain degree of autonomy and flexibility to adapt to changes. According to complexity theory, a lack of autonomy can result in inefficiency, inconsistencies, or a loss of focus and direction within the school (Morrison, 2006). To prevent these types of negative impacts, interventions are

often needed at multiple levels to ensure all stakeholders remain focused on the goals resulting

from the change (Mason, 2008). School leaders may also hesitate to encourage or promote

autonomy or risk-taking during times of change for fear of school failure, negative impacts on

student performance, or increased teacher attrition (Morrison, 2006). If autonomy is discouraged

and there is a lack of quality professional development to support the collective efficacy and

adaptability of the staff, teachers may perceive a reduction in their human or decisional capital

(Melesse & Belay, 2022). This perceived reduction in their capital may lead to re-evaluating

teachers' professional resource-reward balance and decreased job satisfaction.

Although self-organization is a crucial element of complexity theory and a primary

enabler for successful complex systems, there is a downside. Without the proper skills and

resources, attempts to self-organize can lead to inefficiency, timewasting, and the loss of

connectivity between the different system agents resulting in the loss of the organization's values

and direction (Morrison, 2006). The freedom to self-organize can also be negatively impacted by

many factors, such as educational and political policies, curriculum, parent and community

expectations, and administrative support (Mason, 2008). This organizational structure may

require risk-taking and a willingness to accept temporary failures and setbacks to reach long-

term goals. Those in leadership positions do not always welcome this fact; however, by

promoting the human and social capital of the teachers, administrators can support their ability to

self-organize more productively and effectively (Solly, 2018).

Job Satisfaction

Teacher job satisfaction consists of many factors divided into two major arenas, external

and internal factors. External factors include school climate, professional development,

leadership, workload, administrative support, remuneration, and district resources (Imam et al.,

2020; Wangari & Orodho, 2014; Wong & Heng, 2009). It has been hypothesized that school climate is a major factor influencing job satisfaction. Secondary factors such as student-teacher relationships, autonomy, and time pressures have been researched as variables that affect school climate (Aldridge & Fraser, 2016). Availability and quality of professional development and school leadership have also been linked to job satisfaction. Multiple studies have associated effective professional development with self-efficacy, resulting in greater job satisfaction (Liu & Liao, 2019; Wang et al., 2019; Yoon & Kim, 2022). Similar connections were made between school leadership, teacher self-efficacy, and job satisfaction. By empowering teachers and creating positive school climates, school leaders can improve teachers' self-efficacy, collective efficacy, and job satisfaction (Aldridge & Fraser, 2016; Nordick, 2017; Onyeukwu, 2022). School and district leadership can also impact teacher resources. Having adequate and appropriate resources can increase teachers' autonomy and adaptability, increasing job satisfaction (Yolcu & Akar-Vural, 2020; Yoon & Kim, 2022).

Internal factors that affect job satisfaction include adaptability, autonomy, motivation, skill, experience, and self-efficacy (Imam et al., 2020; Wangari & Orodho, 2014). As previously discussed, teachers with greater adaptive skills tend to be more effective with challenges on the job, thus having greater job satisfaction (Ng et al., 2022). These educators are also more likely to be satisfied with their daily achievements and less likely to leave the classroom. Teachers are also more adaptable when they are working in autonomous conditions. Making decisions and controlling their learning environments increases self-efficacy and adaptability, increasing job satisfaction (Onyeukwu, 2022; Yolcu & Akar-Vural, 2020). As it is the teacher's beliefs about their abilities to affect student performance based on their teaching capability, self-efficacy is

impacted by other internal and external factors making it a pivotal element to job satisfaction (Aldridge & Fraser, 2016).

External Factors

Although numerous external factors influence job satisfaction, such as school workload, professional development, and remuneration, this study focuses on the factors that are particularly impactful on teachers' adaptability or professional capital. A positive school climate, including staff and student relationships, is created by supporting collaboration in which teachers can share beneficial ideas and strategies (Skaalvik & Skaalvik, 2014). This collaboration increases job satisfaction by improving the teachers' social and decisional capital and self-efficacy (Aldridge & Fraser, 2016). Professional leadership is another external factor of job satisfaction that impacts teacher adaptability. By providing instructional autonomy and adequate resources, administrators empower teachers and increase their self-efficacy and ability to adapt (Nordick, 2017; Onyeukwu, 2022). Leadership that builds a strong, cohesive school community promotes collaboration, collective efficacy, and student academic achievement (Nordick, 2017). Teachers who actively participate in the school's decision-making process or feel comfortable approaching their administrators with problems or concerns have greater self-efficacy and job satisfaction (Aldridge & Fraser, 2016).

Other external factors influencing job satisfaction are access to instructional resources and effective professional development. Access to and choosing the resources and training needed for instruction can increase a teacher's social and human capital, self-efficacy, and job satisfaction (Wang et al., 2019; Yoon & Kim, 2022). Participation in effective professional development is related to self-efficacy and job satisfaction and improves collective efficacy and professional capital development (Melesse & Belay, 2022; Nordick, 2017; Yoon & Kim, 2022).

The ability to choose the resources and training that best meets their instructional needs is associated with teacher autonomy and decisional capital (Yolcu & Akar-Vural, 2020).

Internal Factors

This study addresses three internal factors of job satisfaction: adaptability, autonomy, and self-efficacy. Each of these factors is interconnected within a teacher's adaptive space and is influenced by their professional capital. Teachers who possess adaptive readiness skills and can access adaptability resources are more effective, can better adapt to change, and have greater job satisfaction resulting in greater retention (Ng et al., 2022). Given the appropriate adaptive space through an autonomous climate, teachers can make instructional decisions based on classroom needs (Onyeukwu, 2022).

Teacher autonomy is reflected in a teacher's ability and freedom to take independent action based on their professional experience and judgment without external controls and pressures which can improve self-efficacy (Yolcu & Akar-Vural, 2020). The levels of autonomy can vary from none at all, where teachers are not consulted on any instructional decisions and cannot practice classroom autonomy, to complete autonomy, in which teachers have total freedom to create and implement instructional materials, programs, and strategies (Yolcu & Akar-Vural, 2020). The instructional autonomy provided to teachers is often evidence of a positive school climate and supportive administration, resulting in increased job satisfaction (Onyeukwu, 2022).

Adaptable educators who teach in an autonomous school climate have higher self-efficacy, leading to greater job satisfaction (Krug & Arntzen, 2010). Efficacy is a teacher's belief in their ability to teach effectively and positively affects student performance (Aldridge & Fraser, 2016). A teacher's self-efficacy is malleable and transforming. As teachers participate in quality

professional development, gain years of experience, and collaborate with their peers, the level of efficacy can increase (Bandura, 2006; Collie et al., 2020). Adaptability skills and an autonomous environment can also improve teacher self-efficacy (Ng et al., 2022). Conversely, teachers with a strong sense of self-efficacy are more apt to learn new strategies, adapt their instruction to meet student needs, be autonomous in their professional decisions, and have higher job satisfaction (Bandura, 2006; Krug & Arntzen, 2010). Additionally, if teachers have elevated levels of self-efficacy, they are more confident in their abilities to influence student performance (Kim & Seo, 2018). Opportunities and impediments in their professional setting continuously reconstruct teachers' sense of efficacy.

Positive Effects of Self-Efficacy and Job Satisfaction

Two significant impacts of teacher job satisfaction are increased student achievement and teacher retention. Teachers who are satisfied with their school climate and professional collaboration work together to increase student achievement through collective efficacy (Nordick, 2017). If teachers have higher levels of job satisfaction, they are more likely to invest in and achieve instructional goals for their students (Perera et al., 2022). This increased investment translates to more engaged teachers willing to adapt instruction to better meet the academic needs of their students (Collie et al., 2018). In addition to building teacher commitment to the school, studies have shown that job satisfaction has a greater influence over achievement than socioeconomic status (Protheroe, 2008).

Self-efficacy, a teacher's belief in their ability and influence over student achievement, can impact instructional decisions that affect student learning and create more positive classroom environments supportive of academic achievement (Aldridge & Fraser, 2016; Perera et al., 2022). Teacher efficacy is connected to instructional choices that enhance student achievement

and has been shown to have the most significant positive impact on teacher performance (Yoon & Kim, 2022). Although Ng et al. (2022) found the relationship between teacher efficacy and student achievement inconsistent, they did report that when the efficacy was explicitly related to instructional strategies, student engagement, or personal teaching, there was a statistically significant positive relationship. As teachers with higher levels of self-efficacy tend to create supportive classroom climates, the positive correlation resulting from particular facets of teacher efficacy may result from those teachers having better organization and planning, more effective instructional strategies, and higher expectations for students (Perera et al., 2022). In a study by Aldridge and Fraser (2016), data indicated that teacher self-efficacy had a three to six times greater impact on student learning than teacher effectiveness. Therefore, even without being the most effective teacher, those with greater self-efficacy and confidence in their instruction and the ability to influence student performance are more likely to positively influence students' academic achievement (Kim & Seo, 2018).

Student achievement is not the only benefit of having high teacher self-efficacy. Teachers who feel good about their classroom performance and instructional abilities are more likely to become invested in their schools and stay at their jobs (Noormohammadi, 2014; Yoon & Kim, 2022). Teachers who do not feel effective with their students or have confidence in their instruction are likelier to experience professional burnout and leave the classroom (Hughes, 2012; O'Brennan et al., 2017). A low sense of self-efficacy and academic influence on their students was the reason for 6% of new teachers leaving the profession (Hughes, 2012). However, by improving teacher self-efficacy, a teacher's motivation and professional commitment are positively impacted, leading to greater effort and performance, further improving self-efficacy and retention (O'Brennan et al., 2017).

Given the current teacher shortage, the impact of self-efficacy and job satisfaction on retention is of critical importance. Teachers who are happier and more satisfied with their jobs stay longer at their schools and in the profession (Aldridge & Fraser, 2016; Wong & Heng, 2009; Worth & Van den Brande, 2020; Yoon & Kim, 2022). Teachers who are satisfied with their jobs have higher levels of self-efficacy, teaching quality, and attrition, while those less satisfied have shorter tenures and lower instructional effectiveness (Aldridge & Fraser, 2016; Worth & Van den Brande, 2020). Since teachers with greater job satisfaction remain in the profession longer, schools should pay close attention to the factors that influence job satisfaction, such as autonomy, adaptability, and self-efficacy (Wong & Heng, 2009).

Adaptability and Professional Capital

Schools are highly dynamic and in a constant state of change. Teachers must continually adapt to schedule changes, curricula, student behaviors, staff expectations, and other variables. Teacher adaptability, as defined by this study, is the ability to respond effectively to changes in job and classroom responsibilities, including instructional materials, classroom schedules, and student needs (Collie & Martin, 2017). Adaptability includes flexibility and adaptive behaviors that allow teachers to cope with challenging situations and be innovative and creative during periods of change (Ng et al., 2022). Adaptability combines readiness, resources, and responses, providing teachers with the skills to overcome objectives and adjust to change. As it can affect their instruction and interactions with staff and students, having adaptive skills may affect a teacher's perception of their abilities and influence their self-efficacy (Patrick, 2012).

Teachers must be given physical and emotional adaptive space during times of change (Onyeukwu, 2022). Without this adaptive space, teacher autonomy and creativity are stifled. Administrative support is vital to the availability and autonomy of the necessary adaptive space.

Without supportive leadership, teachers are less likely to utilize their adaptive skills leading to decreased self-efficacy and job satisfaction (Patrick, 2012). In light of the country's teacher shortage, improving job satisfaction is critical to keeping educators in the classroom. For example, several studies have shown that elevated levels of adaptability lead to increased job satisfaction and retention (Ng et al., 2022).

Several factors can impact a teacher's ability and desire to be adaptable in times of change. Because adaptability encompasses thoughts, behaviors, and emotions, it can be influenced by internal and external factors (Collie et al., 2020). Internal factors such as personality, confidence, self-efficacy, experience, knowledge, and skill set can affect whether a teacher is willing or able to adapt to changes effectively (Collie et al., 2018). These personal resources provide educators with a toolbox of strategies to adjust their practice as needed. Thus, adaptability may help teachers manage work demands more effectively, increasing their self-efficacy and job satisfaction (Collie & Martin, 2017). External factors like the teacher's organizational commitment, peer collaboration, job resources, instructional autonomy, and administrative demands can also impact adaptability. (Collie et al., 2018).

Principal support and a sense of autonomy are crucial factors influencing teacher adaptability (Collie & Martin, 2017). When given the opportunity and freedom to make choices based on their personal and professional needs and the needs of their students, adaptable behaviors are supported by teacher autonomy. The quality of teacher performance is greater when there is a higher level of adaptability (Andres et al., 2021). Regardless of a teacher's experience or background, schools that can provide a positive and supportive working environment promote strong adaptability in their staff. These conditions make teachers more

independent and able to adapt to constant change. They also make teachers more committed to

and satisfied with their jobs.

Figure 1

Conceptual Framework of Professional Capital, Adaptability, and Job Satisfaction
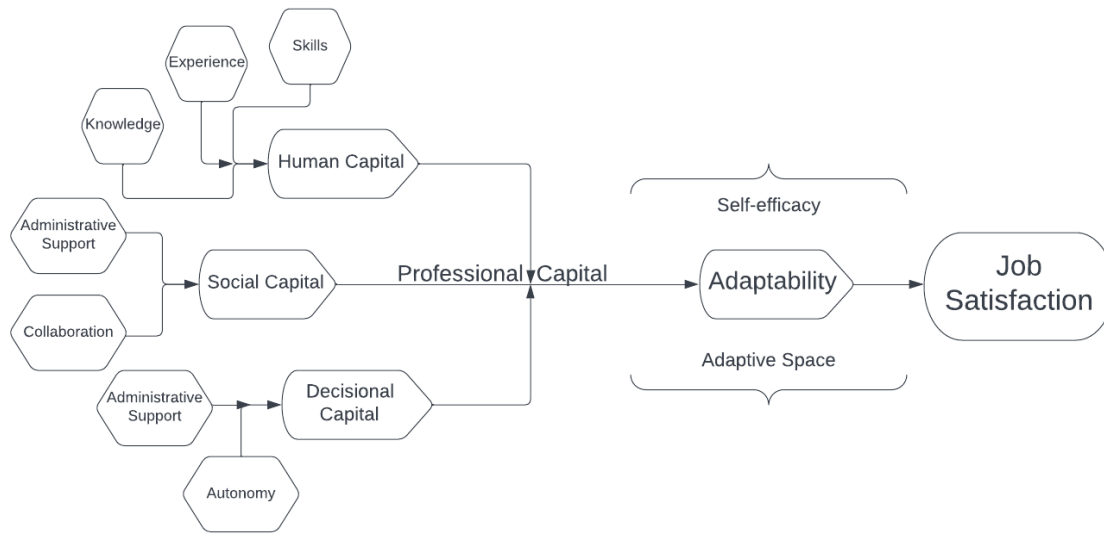
Note: This diagram illustrates the professional capital foundation for developing adaptability
enveloped in a teacher's sense of self-efficacy and adaptive space.

Figure 1 illustrates the interwoven complexity of professional capital, its role in

developing teacher adaptability, and its potential impact on job satisfaction. The components of

professional capital encompass many factors that influence job satisfaction and impact

adaptability. By breaking down and assessing the various elements of human, social, and

decisional capital, the foundation for teachers' instructional adaptability is revealed (Collie et al.,

2018; Griffin & Hesketh, 2003). As adaptability develops and changes, it is enveloped by and

reciprocates changes in a teacher's self-efficacy and adaptive space, resulting in varying degrees

of job satisfaction (Gilead & Dishon, 2021). The next portion of this literature review will

explore the different stems of professional capital individually and more thoroughly explain their connections to each other and teacher adaptability.

Adaptive Space

In his book Adaptive Space, Arena (2018, p. 3) states that if organizations "don't adapt, they die." He describes the necessity of complex systems to adapt by reinventing themselves or changing their structure to meet needs, demands, and innovations. Schools are complex adaptive systems consisting of numerous intricate and interconnected agents. As the education system undergoes constant change, its agents need to be able to adapt for the organization to survive. These adaptations can only come if they are provided with proper adaptive space. The concept of adaptive space provides a framework for adaptations to take place efficiently and effectively. This study defines adaptive space as the "relational, emotional, and sometimes physical space necessary for people to freely explore, exchange, and debate ideas" (Arena, 2022, p. 1).

Teachers need adaptive space to prevail over the many changes they face within the complex school system. Organizations can become stale and locked into predictable behaviors under the guise of maintaining stability. However, the goal of a complex system is not stability but successful adaptation to change. Arena's (2018) challengers create positive disruptions to address the system's dynamic internal and external changes. Instead of attempting to maintain the status quo, the administration can support this constructive dissent by providing teachers with adaptive space. Without adaptive space, teachers cannot improve peer collaboration, increase professional growth, or provide the appropriate, differentiated instruction their students need (Parsons et al., 2016). When given the skills and opportunities to tackle systemic change, teachers develop greater adaptable skills and can positively contribute to the success of the complex education system.

Ongoing professional development, decision-making opportunities, and resource access are required to support this adaptive space (Hargreaves & Fullan, 2013). When teachers are provided with positive adaptive space, schools promote the learning of new instructional strategies, increased collaboration, and greater levels of autonomy (Loughland & Alonzo, 2018). Adaptive space creates new connections between the agents of a complex system and enables those agents to discover and develop new ideas within the organization (Arena, 2018). Building new connections protects the interwoven complexity of the system by creating alternative solutions to problems when they arise, further increasing teacher adaptability. These connections can be further supported through the three elements of professional capital: human, social, and decisional.

Professional Capital

A significant positive relationship exists between teachers' professional capital development and job satisfaction (Melesse & Belay, 2022). Professional capital is a teacher's collective value or worth comprised of three types of capital: human, social, and decisional capital (Hargreaves & Fullan, 2013). Human capital is the talent, skills, knowledge, and experience of the individual teachers that are valuable to the school organization, social capital is the collaborative power and supportive culture of the teachers within a school, and decisional capital is the capability, wisdom, and expertise of the teachers to make effective judgments associated with their profession (Hargreaves & Fullan, 2013; Solly, 2018). These three types of capital play a key role in determining teacher adaptability and adaptive space. According to a study conducted with TALIS, human, decisional, and social capital are also indices of teacher professionalism as shown by a teacher's knowledge base, autonomy, and peer networks (OECD, 2016). Not exclusively bound within decisional capital, teachers' instructional autonomy was

discussed concerning other aspects of human and social capital. Self-efficacy was addressed within each of the three facets of professional capital.

Human Capital

An individual's human capital consists of skills, knowledge, and experience. Human capital determines a teacher's effectiveness through their content knowledge, understanding of pedagogy, and their application of both to classroom instruction (Solly, 2018). Possessing a large amount of human capital can improve a teacher's sense of self-efficacy, job satisfaction, and student academic achievement (Melesse & Belay, 2022). A teacher's self-efficacy defines confidence in their ability to provide quality instruction and increase student achievement (Gkolia et al., 2014). Thus, educators with substantial human capital would have greater personal resources to achieve these goals due to their heightened skill, experience, and knowledge levels. Access to professional development and collaboration within a positive adaptive space would continue to increase teachers' knowledge, skills, and human capital resulting in greater self-efficacy (Melesse & Belay, 2022).

Classroom demands require educators to have expansive knowledge and understanding of their content and pedagogy. Increasing professional knowledge leads to more informed decision-making and enhances teacher adaptability (Parsons et al., 2016). The ongoing and frequent changes in education demand adaptability. Teachers more familiar with change-related activities may quickly adapt based on their prior knowledge and experience (Griffin & Hesketh, 2003). This adaptive ability allows veteran teachers to apply their knowledge to new or atypical situations more effectively, resulting in higher confidence and self-efficacy (Hobbs, 2013).

However, conflicting data support a negative correlation between teacher experience and adaptability. Some schools have communicated that teachers with less experience are more

adaptable, and research has shown that as teachers gain experience, they are less innovative (Collie et al., 2020). The same study suggested that adaptive behaviors decrease as teacher experience leads to the refinement of instructional methods and strategies. A different study suggested that the solution to increasing adaptability was hiring more compliant teachers less committed to specific instructional ideals (Glazer, 2018). However, this practice could result in hiring less experienced or qualified teachers. Depending on whether educators have the adaptive skills and resources, change may be a critical factor in teacher attrition. A teacher with a higher level of adaptability may need more autonomy to practice their behaviors. In contrast, a teacher with less adaptability and plenty of autonomy may be overwhelmed by the choices and responsibilities (Eryilmaz & Kara, 2017). Either way, institutional changes coupled with a teacher's degree of adaptability influence job satisfaction and may be critical elements to when and why educators leave the profession (Glazer, 2018).

Human Capital's Relationship to Self-efficacy and Job Satisfaction. Teachers with a greater sense of self-efficacy are more likely to have greater job satisfaction and remain in the profession (Noormohammadi, 2014). Teachers leaving the classroom have reported a lack of confidence in their instructional effectiveness and ability to help their students learn. Nearly 6% of teachers leave the profession due to a perceived lack of positive influence on their students' achievement (Hughes, 2012). This statistic is critical to a report that states that a teacher's self-efficacy is three to six times more influential than teacher effectiveness on student learning (Aldridge & Fraser, 2016). On the other hand, conflicting data claim that teacher efficacy is not directly associated with student achievement but has an indirect impact due to its effects on student motivation and behavior (Ng et al., 2022). Inconsistent data in earlier studies support further investigating the connection between teacher self-efficacy and student achievement.

The intricate relationship between adaptability, autonomy, and self-efficacy supplies a rationale for why efficacy was included in the literature review for this study. Teacher autonomy and adaptability have been intricately linked with an educator's sense of self-efficacy and resulting job satisfaction (Griffin & Hesketh, 2003; Patrick, 2012). Teachers are more likely to learn and use new strategies, support student autonomy, and improve student achievement if they have a strong sense of self-efficacy (Krug & Arntzen, 2010). Educators who feel supported to make autonomous decisions have shown greater adaptability, and evidence shows that efficacy can predict teacher adaptability (Loughland & Alonzo, 2018). Adaptability promotes experience, a positive factor of human capital and self-efficacy (Collie et al., 2020). For example, self-efficacy is positively associated with adaptive behaviors, and cognitive flexibility is one of the best predictors of adaptive behaviors, further supporting the link between adaptability, autonomy, and efficacy (Griffin & Hesketh, 2003).

A teacher's sense of self-efficacy comes from their ability to make instructional decisions and adapt to student needs and classroom conditions (Krug & Arntzen, 2010). On the other hand, teachers who lack the confidence to meet student needs struggle to adapt their instruction effectively (Collie et al., 2020). Adaptable teachers have a greater sense of efficacy, and teachers with greater efficacy display more adaptive behaviors. This reciprocal relationship creates an iterative cycle of teacher and student impact. Teachers with adaptive readiness and more adaptability resources can respond more effectively to instructional challenges (Ng et al., 2022). As a result, these teachers are often given more autonomy and develop more adaptive behaviors (Loughland & Alonzo, 2018). Thus, the teachers have greater job satisfaction and a stronger commitment to their organization, resulting in higher retention and student performance.

Social Capital

The collective power of a group of people is considered their social capital (Solly, 2018). This branch of professional capital is the most influential because it also considers the supportive nature of the group (Hargreaves & Fullan, 2013). Teacher collaboration and administrative support must be considered when evaluating a teacher's social capital. Data collected from the TALIS assessment have shown a strong relationship between collaboration, teacher self-efficacy, and job satisfaction (OECD, 2016). The data showed that by increasing collaborative opportunities, workers' productivity and social relations with other workers improved, contributing to increased efficacy and job satisfaction.

A Demir (2021) study found that social capital was associated with implementing change, student achievement, job satisfaction, and teacher retention. Having meaningful interactions with their colleagues about instructional and professional challenges improves teachers' social capital and supports their human capital by fostering resource and information exchange (Baker-Doyle, 2015; Demir, 2021). Collaboration opportunities provide an outlet for adaptability and implementation of change by helping teachers do things they could not do alone. Agents should focus on their social capital to institute faster, more effective changes within a complex system (Solly, 2018). Schools can make significant and sustainable changes when they invest in social capital by encouraging and supporting teacher collaboration (Hargreaves & Fullan, 2013). Research has shown that teacher collaboration increases math and reading scores and improves an individual's human capital (Hargreaves, 2019). Unlike human or decisional capital, social capital decreases if not used; hence, building and supporting professional social networks is vital for teacher adaptability and job satisfaction (Baker-Doyle, 2015).

Schools are complex systems that support collective adaptation and are open systems that interact and co-adapt to changes within the school environment (McMurtry, 2009; Wernli et al.,

2021). The dynamic relationships between administration, teachers, and students create

opportunities for self-organization and diverse adaptations within the complex system.

Expectations placed on teachers by the administration can improve or hinder teachers' ability to

adapt to the internal and external pressures that affect this system (Hobbs, 2013).

Social capital depends on positive teacher interaction and requires administrative support.

When surveyed teachers claimed they had administrative support, they tended to be more

adaptable and resilient to change (Collie & Martin, 2017; Munda, 2021). Teachers whose

administration does not give ample time for collaboration have restricted utilization and

implementation of their adaptability skills; however, teachers are more likely to adapt

successfully to change when they have supportive administrators (Griffin & Hesketh, 2003;

Quartz et al., 2008). With the proper adaptive space, the degree and quality of adaptive skills are

recognized and supported. Administrators must provide a change-conducive climate for teachers

to adapt confidently to system disruptions (Chapman & Elbaum, 2021). Leader support promotes

resiliency by allowing teachers to manage risks directly and tackle adversity (Martin et al.,

2015). Teacher support involves identifying professional needs and supplying the appropriate

training to address the gap in adaptive skills while allowing teachers to regulate and respond to

changes within the system (Parsons et al., 2016; Patrick, 2012). When given administrative

support and adaptive space, teachers report the ability to recognize problems and act to modify

the situation (Doney, 2013).

Building and supporting a positive school climate starts with effective and motivational

leadership (Onyeukwu, 2022). Teachers also report the ability and opportunity to build positive

relationships with their colleagues to build a professional support system. This professional

environment improves job satisfaction, teacher collaboration, and student achievement resulting

in increased social capital for all stakeholders (Bandura, 1997; Collie et al., 2020). One of the

ways administrators can promote self-efficacy and professional capital is by giving the

appropriate adaptive space and training for teachers to develop their adaptability skills (Gilead &

Dishon, 2021).

     Social Capital's Relationship to Self-efficacy and Job Satisfaction. One social capital

factor that affects self-efficacy and job satisfaction is a school's instructional leadership and

administrative support. Data have suggested that administrative support might increase job

satisfaction and decrease teacher retention (Pearson & Hall, 1993). Administrators supporting an

autonomous classroom help improve teacher self-efficacy and job satisfaction by supporting

teachers' professional knowledge, skills, creativity, and adaptability (Behr, 2021; Griffin &

Hesketh, 2003). Making the school environment conducive to teacher adaptability provides a

supportive culture for teachers to grow professionally (Hobbs, 2013). By acknowledging their

professional judgment and authority, administrators give teachers a stronger sense of self-

efficacy resulting in greater job satisfaction. These teachers are more committed to the profession

and less likely to leave.

     Teacher collaboration is another way to build a supportive culture and collective efficacy

in a school, increasing social capital (Solly, 2018). School leadership can significantly affect

teachers' self-efficacy and a school's collective efficacy (Nordick, 2017). With administrative

support and collaboration, social capital becomes the glue for the vast interconnected web of a

school system. Collaboration allows teachers to engage in adaptive practices, strengthen system

complexity, and improve individual and collective efficacy (Nordick, 2017). Teacher

collaboration allows educators to reflect upon and adapt their instructional practices.

When a complex system undergoes disruptions, social capital, more so than human capital, supports quick and effective adaptations and change (Hargreaves & Fullan, 2013). Positive and consistent communication, collaboration, support behaviors, and modeling desired behaviors were characteristics of leaders who promoted strong teacher self-efficacy. By supporting a positive school climate by building collective and individual teacher self-efficacy, school leadership can reduce teacher burnout and improve job satisfaction and retention (Aldridge & Fraser, 2016; Swanson, 2010). Teachers with an acute sense of self-efficacy tend to have a stronger commitment to the profession and higher levels of enthusiasm about their job, thus reducing the likelihood they will leave (Gkolia et al., 2014; Protheroe, 2008).

Decisional Capital

A teacher's decisional capital refers to the ability and freedom to make professional judgments regarding their classroom and instruction (Hargreaves & Fullan, 2013). Decisional capital requires the resources, knowledge, and interactions of human and social capital to be effective and productive (Melesse & Belay, 2022). This element of professional capital also identifies a teacher's ability to make sound and informed professional decisions during times of disruption and change (Fullan, 2016). Teachers cannot adapt to change within the complex education system without decisional capital. This lack of preparedness can apply to an individual or the collective agents within the system; therefore, the social capital gained by teacher collaboration coexists with teachers' decisional capital (Fullan, 2016). The relationship between these two forms of capital is also deepened with supportive leadership. Administrative support can make teachers feel that their professional input and choices are important; however, without support, teachers may feel disregarded, lowering their self-efficacy and job satisfaction (Melesse & Belay, 2022).

Instructional Autonomy. Teachers' decisional capital is supported by administrators providing them autonomy in their classrooms. A teacher's instructional autonomy is described as an educator's ability to make their own decisions about their methods of instruction and what they will teach (Kim et al., 2008). The freedom and ability to make daily decisions about classroom practices are vital to a teacher's sense of instructional autonomy. With federal education policies, more standardized curricula and assessments, and increased teacher accountability, teachers' classroom autonomy has been declining (Behr, 2021; Chapman & Elbaum, 2021; Parsons et al., 2018; Voigt, 2021). Recent educational reforms have limited teacher decision-making and reduced the adaptation of instruction to meet local and individual needs. Consequently, teacher decisional capital has been stifled. Without the freedom to adapt their instruction, teachers lose their sense of autonomy, thus impacting their job satisfaction and resulting in a lower sense of self-efficacy (Glazer, 2018). Without instructional autonomy, teachers cannot improve their adaptability skills and may experience reduced retention rates.

When teachers are autonomous in their classroom, evidence has shown a positive impact on student achievement and job satisfaction (Yolcu & Akar-Vural, 2020). Educators with instructional autonomy are more likely to work independently, generate innovative ideas, and positively adapt to change (Yolcu & Akar-Vural, 2021). Teachers with a greater sense of instructional autonomy work more productively and feel they have a say in important school matters. As with adaptability, administrative support is critical in achieving an autonomous school climate for teachers. Some studies suggest that if school leaders promoted greater autonomy, job satisfaction and teacher retention would improve (Pearson & Hall, 1993). In similar studies, the degree of perceived teacher autonomy was related to increased job satisfaction and lower professional stress and attrition (Worth & Van den Brande, 2020). Not

only has an autonomous environment been associated with job satisfaction and retention, but data has also revealed a negative association between autonomy and teacher burnout which can influence a teacher's plans to remain in the classroom (Skaalvik & Skaalvik, 2014). In one study, teachers leaving the profession often mentioned burnout and a lack of autonomy as reasons for quitting (Pearson & Hall, 1993). Not giving teachers instructional and professional autonomy increases job dissatisfaction and the likelihood of educators leaving the profession.

Several factors impact a teacher's presence and degree of instructional independence. Multiple factors can limit autonomy, such as political policies, strict or standardized routines, district or school policies, increased teacher supervision and observations, and negative parent relations (Behr, 2021; Chapman & Elbaum, 2021; Yolcu & Akar-Vural, 2021). Federal, state, and local mandates significantly impact teachers' independent decision-making. Policies related to teaching positions, enrollment, and decision-making roles seldom allow for much teacher autonomy (Kim et al., 2008). Following all the dictated policies is often impossible, and teachers are forced to choose which ones to follow or how strictly they will enforce them, creating limited autonomy (Floden et al., 1988). This type of autonomy can be counterproductive if teachers do not adequately understand the institutional policies and practices. This scenario can occur when leadership fails to provide professional development to train teachers to make effective instructional decisions.

Fortunately, many factors positively influence or promote autonomy for educators. Teacher support and distributed leadership are two of the most critical factors influencing autonomy (Kim et al., 2008; Liu et al., 2021). Due to less pressure and more requested input from the administration, teachers with more experience report higher levels of instructional autonomy which is a significant predictor of job satisfaction (Kim et al., 2008). Other factors

influencing teacher decision-making freedom are more personal such as an individual's

motivation, critical thinking skills, and ability to self-assess (Yolcu & Akar-Vural, 2021).

Teachers with a powerful sense of personal responsibility tend to be more autonomous in their

instruction and professional responsibilities. This increased autonomy results in more diverse

instructional methods, student-centered activities, and student success.

A teacher's level of autonomy can also affect their ability and willingness to adapt to

changes (Hobbs, 2013). Instructional autonomy gives teachers a certain degree of flexibility that

enables them to be more adaptable to change. Accordingly, when there are local or systemic

disruptions, autonomous teachers can adapt to change, access untapped resources, and create

new connections within their complex system (Imam et al., 2020). Teachers who have the

freedom to modify instruction and classroom practices are more likely to try new things knowing

they have the choice to alter them if they do not work. This freedom gives teachers control and

leverage over their professional decisions, increasing their self-efficacy and job satisfaction

(Behr, 2021). The individual and collective locus of control within a school supports the self-

governing of a complex system (McMurtry, 2009). Complexity theory supports a balance

between organizational constraints and individual freedom, as demonstrated by the continuum of

autonomy within a complex system (Behr, 2021). Although given autonomy to be flexible and

adaptive to change, teachers still must act within the boundaries of professional expectations.

Decisional Capital's Relationship to Self-efficacy and Job Satisfaction. Numerous

studies have connected autonomous teaching to job satisfaction. Surveyed teachers with higher

autonomy scores reported greater job satisfaction, and schools with more instructional autonomy

have better teacher retention (Pearson & Hall, 1993; Worth & Van den Brande, 2020). Teachers

with low levels of instructional freedom are more likely to experience job burnout and leave the

profession, while those with administrative support and instructional autonomy have higher

attrition rates (Behr, 2021; Glazer, 2018). Studies have also claimed that teachers with greater

autonomy work more efficiently, are more committed to their jobs, and are more proactive when

tackling problems (Imam et al., 2020). In addition, teachers who report having the freedom to

make instructional decisions felt they had a greater impact on student performance due to having

greater control over professional decisions resulting in higher levels of self-efficacy and job

satisfaction (Behr, 2021; Glazer, 2018; Melesse & Belay, 2022; Yolcu & Akar-Vural, 2020).

Instructional autonomy allows teachers to self-reflect on their professional decisions and

to differentiate their teaching to meet the needs of individual students improving their academic

achievement and the teacher's sense of self-efficacy (Behr, 2021; Melesse & Belay, 2022).

Working in an autonomous environment helps expand teachers' professional capital by acquiring

new skills, knowledge, and professional networks to support adaptive behaviors (Nolan & Molla,

2017). However, even if teachers have elevated levels of social and human capital, without

autonomy and decisional capital, they are not free to use their skills and knowledge to adapt their

professional practices (Nolan & Molla, 2017; Voigt, 2021). Administrative support of teacher

autonomy promotes job satisfaction and retention, and educators with more autonomy have

reported greater job satisfaction (Pearson & Hall, 1993; Worth & Van den Brande, 2020).

Teachers with the autonomy to make instructional decisions develop adaptive abilities to manage

complex tasks and system disruptions (Griffin & Hesketh, 2003). When teachers feel their ability

to do their job and achieve success is being infringed upon through a lack of autonomy, some

leave the profession (Glazer, 2018). It is not enough for teachers to have knowledge and

resources; they must also be free to access and utilize them. Although teachers may have the

professional knowledge and collaborative network necessary to adapt to change, there is no decisional capital without instructional autonomy.

Complexity Theory Implications

Complexity theory says that individuals are more likely to adapt successfully when faced with challenges if they have positive adaptive skills. Effective professional development practices are a major component of teacher adaptive skills (Morrison, 2006). By providing relative and pertinent staff development before, during, and after a change, teachers can increase their human and professional capital. Improving their capital increases their ability and motivation to adapt and improves their self-efficacy to evolve successfully in new circumstances (Melesse & Belay, 2022). Understanding the needs of the school and its stakeholders is critical to teachers' ability to adapt to change successfully. The role of conducting effective professional development to aid change falls on school leadership. For a school to successfully adapt to change, members of the leadership team must also have positive adaptive skills with the ability to focus on the big picture rather than the minute details of the change (Morrison, 2006).

A vital facet of a complex system is its self-organization. One of the most crucial elements of a successful system is that the decision-making is distributed (Rzevski, 2019). One of the reasons complex systems are adaptive is that they can alter their structure when responding to system disruptions (McMurtry, 2009). The system can adapt at multiple levels through individual and collective autonomy to support agent interactions and cohesion. Although it has constraints, the complex system is not fixed, and therefore, its agents can co-adapt to internal and external disruptions (Deogratias, 2018). For this reason, school leaders need to remove the centralized control of their system and replace it with collaborative teamwork that allows for collective autonomy.

The recent COVID-19 pandemic supplied a real-life example of the importance of viewing teacher adaptability through complexity theory. As changes were occurring, sometimes by the minute, teachers were in a never-ending cycle of adapting. Ongoing disruptions were upsetting the system's stability which allowed for prior success (Glazer, 2018). Therefore, the system and its agents needed to adapt to keep the system functioning. Internal and external disruptions called for individual and collective adaptations of professional practices. Teachers had to respond to the change in student needs and new demands within the school environment by using their professional capital (Chapman & Elbaum, 2021).

The system disruptions demanded that teachers have the knowledge, skills, resources, and support to adapt their lessons, teaching strategies, and technology usage. Accompanied by administrative support, teachers relied upon their professional network and collaborative knowledge to address massive system disruptions (Wernli et al., 2021). Without human, social, and decisional capital, teachers risk failure, and when one agent of a complex system fails, it leads to the failure of its interconnected parts (Wernli et al., 2021). Teachers' collective adaptation during the pandemic is the very essence of complexity theory. The core elements of complex systems are assessing and managing system risks, proposing and implementing solutions, and co-evolving to maintain a functioning system.

Complexity theory supports a cyclical framework created by working conditions and teacher performance. Administrative teams that provide supportive professional development, a positive school climate, and an environment where teachers feel they have instructional and professional autonomy will have a staff with greater self-efficacy and job satisfaction. Also, this positive work environment encourages collective efficacy and adaptability, boosting teachers'

professional capital and making them happier at work and more likely to stay in their jobs (Melesse & Belay, 2022).

Secondary Science Teachers

Retaining science teachers, especially at the secondary level, has become a critical issue for public education. Except for special education and math, science teachers have lower in-school and in-state retention rates than other secondary content areas (Wan et al., 2021). Within the first five years at a school, science teachers leave at a 26% higher rate than similar non-science teachers (Allen & Sims, 2017). New science teacher attrition rates are 35% higher than their non-science teacher peers, and those with physics or engineering degrees have the highest rate with 87% leaving their first school within five years. Science teachers leave the profession at a 5% higher rate than their non-science colleagues. Teachers with advanced science or math degrees are less likely to remain in their original schools and are 1.85 times more likely to leave the profession altogether (Tai et al., 2007).

More than most other content areas, science teachers often have advanced degrees and certifications. For example, in an NCES data report, 72% of science teachers had a postsecondary degree and a teaching certification compared to 69% of English, 61% of math, and 68% of social science teachers (Hill & Stearns, 2015). In a more recent study, 58% of science teachers had their master's degree in their content area compared to 56% of English, 56% of math, and 53% of social sciences teachers (NCES, 2020; Richardson et al., 2020). The percentage of doctorate degrees and secondary certifications were equally comparable, with an even larger gap of 9-27 percentage points in the number of science teachers with degrees in a vocational or technical field (NCES, 2020). Having more educated teachers leads to better-

educated students. Data has shown that educators who taught courses in which they had their degrees generated higher student test scores (Hill & Stearns, 2015).

One characteristic of science teachers that makes them highly unusual in the profession is that they often must teach subjects for which they have no degree. For example, a teacher with a biology degree may have to teach chemistry and physics in addition to biology. Teaching multiple subjects and courses outside their expertise increases the likelihood of teachers leaving their school and eventually the profession (Allen & Sims, 2017). This phenomenon is particularly true of educators with physics or engineering degrees. Teachers with these degrees leave the education profession within the first five years at a rate 87% higher than other content-area teachers (Allen & Sims, 2017).

As the need for individuals with more advanced knowledge and skills increases, science teachers are also more likely to be recruited by other schools or industries where they can receive higher pay (Hampden-Thompson et al., 2008; Tai et al., 2007). Therefore, science teachers with a lower base salary are more likely to leave the profession to seek more gainful employment. Hampden-Thompson et al. (2008) found that over 25% of science and math teachers reported salary and benefits as the main reason for leaving the profession compared to less than 13% of other content teachers. In another study conducted by Allen and Sims (2017), data showed that, unlike other content areas, science teacher shortages persisted even during economic downturns. Teachers with a STEM degree earned more outside education and could obtain a higher-paying job by leaving the classroom. Teacher pay is one of many factors negatively affecting science teacher retention. Job satisfaction was given by nearly 21% of science and math teachers as the reason for leaving compared to only 15% of other teachers (Hampden-Thompson et al., 2008).

Lower retention rates, more advanced degrees, higher levels of education, and a greater risk of them being lured into better-paying jobs outside of the classroom are reasons the education system needs to pay close attention to secondary science teachers and their level of job satisfaction. As a high-needs area with greater shortages than all content areas other than special education, recruiting and retaining science teachers is highly important (Wan et al., 2021). Not only does their professional knowledge contribute to the academic environment of their colleagues, but it improves students' academic achievement. By analyzing secondary science teachers' adaptability, this study aimed to provide data that could be used to improve their job satisfaction and increase teacher attrition rates.

Methodology

This study was based on the factors of professional capital that impact teacher adaptability and how the resulting adaptability influences secondary science teacher job satisfaction. Although it could have been conducted with a simple linear regression analyzing adaptability as the predictor variable and job satisfaction as the outcome variable, this study intended to provide greater clarity on the underlining factors of adaptability and their influence on job satisfaction. For this reason, the study utilized multiple regression by breaking down adaptability into human, social, and decisional capital factors.

Multiple regression is used in data analysis to evaluate how changing the combination of predictor variables can predict the degree of change in the outcome variable (Keith, 2019). This type of data analysis can predict the size and direction of the correlation between multiple variables. Using multiple regression is beneficial in showing correlation and revealing its strength. The relationship between the predictor and outcome variables can then be used to predict future variance. In addition, multiple regression was suitable for this study because it uses

continuous predictor variables, such as adaptability. Multiple regression was also appropriate for this study because the data analysis was from nonexperimental research. An important advantage of multiple regression that was particularly beneficial for this study is its ability to show linear and nonlinear relationships between variables (Field, 2018). Since adaptability and the three components of professional capital are continuous variables, this methodology provided more variance and precision to the data analysis.

However, one considerable disadvantage of multiple regression is the presence of covariates and confounders (Keith, 2019). Covariates are those variables that may influence the outcome variable, job satisfaction, but not have an influence on adaptability or professional capital (Field, 2018). These covariates might include factors such as salary, age, marital status, number of years of employment, workload, student behaviors, school size, intrinsic motivation, and job commitment (Aldridge & Fraser, 2016; Imam et al., 2020; Melesse & Belay, 2022; Wangari & Orodho, 2014; Wong & Heng, 2009; Yoon & Kim, 2022). These external variables may have considerable influence over job satisfaction but were not included in the study and would need to be addressed in further studies. Confounders are covariates that influence the outcome and predictor variables (Keith, 2019). This study encountered several confounders, such as official policies, school climate, teaching schedule, class size, personality, and union status (Aldridge & Fraser, 2016; Onyeukwu, 2022; Park & Johnson, 2019; Worth & Van den Brande, 2020). These variables could have influenced the relationship between teacher adaptability and job satisfaction.

Conclusion

Teacher attrition continues to be a blight on the education profession. Without examining the factors that influence retention, teachers will continue to leave the classroom searching for a

more promising career. Numerous studies have shown that reducing teacher attrition stems from improving job satisfaction (Iqbal et al., 2014; Wong & Heng, 2009; Worth & Van den Brande, 2020; Yoon & Kim, 2022). Although many factors influence job satisfaction, teacher adaptability has yet to be thoroughly researched. Numerous studies have been conducted on adaptive teaching in which teachers modify their instruction based on individual needs (Chapman & Elbaum, 2021; Collie et al., 2020; Loughland, 2019). However, the spotlight of these studies has been solely on instructional autonomy rather than a teacher's overall ability to adapt to changes within the profession. Although this study addressed instructional autonomy, the broader focus of teacher adaptability also included elements of professional capital such as peer collaboration and self-efficacy.

Earlier studies have also examined various aspects of professional capital on teacher performance; however, there needs to be more research on the connection between professional capital and adaptability or job satisfaction (Melesse & Belay, 2022; Nolan & Molla, 2017). In examining the literature on this topic, I did not find studies that specifically sought to find connections between professional capital, adaptability, and job satisfaction. This was an area in need of further study. Another gap in the literature on this topic included research on specific groups of educators, mainly secondary science teachers. Having lower retention rates and many opportunities for employment outside of the classroom, science teachers are considered a high-need subject area, and schools often have openings for these positions (Wan et al., 2021). Thus, this research study aimed to closely examine the relationship between adaptability and job satisfaction, specifically in secondary science teachers, and show the reader how these factors intersect in education.

Teacher adaptability is a desired characteristic for successful and effective educators (Collie et al., 2020; Imam et al., 2020). As witnessed during the recent COVID-19 pandemic, a teacher's willingness, and ability to adapt to change became critical to continuing their practice (Pegram & Kreienkamp, 2021). Therefore, this study aimed to examine how the factors of professional capital influence teacher adaptability and how this adaptability can influence job satisfaction. Due to their higher attrition rates, this study focused specifically on secondary science teachers. Data from this study can hopefully be used to support teacher adaptability and improve science teacher job satisfaction to increase retention rates.

Chapter 3: Research Methods

Introduction

This chapter was designed to provide an overview of the methodology used in this study and link the overall process used to the research questions. This study was based on a quantitative multiple regression analysis research model designed to determine the influence of teacher adaptability on job satisfaction. The design model was chosen because it allows for examining the relationship between the predictor and outcome variables and can be used to predict future patterns in those relationships. The regression analysis model can reveal the presence and strength of the relationship between variables and whether that relationship is positive or negative. Conducting research with this method allowed random sampling with the ability to analyze specific demographics. This feature was particularly beneficial when differentiating the strength of variable relationships between teachers with different years of teaching experience, ages, and grade levels. Although demographic data were used to tease out other relationships, the study focused specifically on secondary science teachers.

There were numerous benefits and limitations to this research design model. One of the primary benefits of this model was the ability to collect copious amounts of data in a brief period with a survey. This is particularly advantageous when needing a large sample size and the ability to identify outliers quickly. Not only does this model show relationships between variables but also their strength. The regression analysis model has high external validity; therefore, data collected from this study could be used to make predictions and provide solutions to the issues being examined. The multiple regression model was also chosen because this study was nonexperimental and analyzed continuous variables.

One major limitation of this model is that it reveals the presence or strength of the correlation between variables, but it will not determine causation. Survey questions were written strategically to ensure the data collected was valid for indicating the correct relationship between variables. Another limitation is that since the quantitative data for this method was collected via survey, there was the probability of bias in survey responses and the possible underrepresentation of specific demographics, such as male teachers or new teachers.

Multiple regression analysis can reveal numerous covariates and confounders. Using this research design model, one must minimize the confounding variables and individual participant differences that could impact the results. This study encountered several factors: class size, student behaviors, and teacher salary. For this reason, the study focused only on secondary science teachers. The number of covariates was reduced by narrowing the field sample, minimizing their impact on the results. Finally, since the data for this type of model were not constant, the survey should be re-conducted and re-evaluated over time to find changes or potential trends and patterns in variable relationships.

Research Design and Approach

This study was based on a quantitative multiple regression analysis research model designed to determine the degree of influence that professional capital elements of teacher adaptability have on job satisfaction. A quantitative approach was chosen to collect more objective data from a larger sample. The multiple regression analysis models were selected based on the study having one continuous outcome variable (job satisfaction) and one continuous predictor variable (adaptability) that was divided into three factors (human, social, and decisional capital) that were analyzed individually. Using a Likert scale-based survey, the data collected could be analyzed through SPSS to find correlations and their strength and significance.

Although they can never be eliminated, in a regression model, one must account for and control as many external variables as possible and acknowledge their potential influence on the findings.

This study had several external variables and covariates to consider when analyzing the data. Factors such as class size, personality, district resources, and union status could impact teacher adaptability and job satisfaction (Aldridge & Fraser, 2016; Bozeman et al., 2013; Park & Johnson, 2019). However, none of these were considered or included in the data analysis. Several confounders can influence job satisfaction outside of a teacher's level of adaptability, which also needs to be considered when examining the data. School climate, student behaviors, salary, and school size may affect teachers' job satisfaction, but they were also not considered in this study. (Aldridge & Fraser, 2016; Onyeukwu, 2022; Park & Johnson, 2019; Worth & Van den Brande, 2020). The covariates analyzed in this study included the participants' sex, age, grade level, number of years taught, COVID-19 teaching experience, and the number of different schools and grades taught.

The conceptual framework of professional capital and the theoretical framework of complexity theory were used to evaluate and explain the findings of this research study. To gain a complete understanding of the problem, the research study focused on the following research questions:

1. What are the components of professional capital that influence teacher adaptability?
2. How does teacher adaptability influence secondary science teachers' job satisfaction?

Setting and Sample

The participants for this study were a random sampling of 6-12th grade science teachers in the United States. A survey modeled from a collection of pre-existing questionnaires and scales was created on Google Forms and distributed via teacher forums on Facebook. The

following private and public groups were used: Teachers Ask Teachers (196k members); Science

Teachers (22k members); Middle School Science Teachers Unite (15k members); Teachers Who

Love Science (18k members); Middle School Science Teachers (23k members). Social media

surveys were used due to their widespread reach, low cost, large and diverse sample access, short

response time, and high response rates (Mirabeau et al., 2013; Nayak & Narayan, 2019). Social

media data collection is one of the most effective platforms for reaching populations with low

prevalence and visibility (King et al., 2014; Moreh, 2019). One study that compared data from

different modalities reported indistinguishable differences between social media results and

traditional survey sources (Casler et al., 2013). Data collected from online media is just as valid,

if not superior, to that collected from other sources (Casler et al., 2013; Moreh, 2019).

The parameters for participant data included secondary science teachers with a minimum

of five years of teaching experience currently employed in a public school. Since membership in

online organizations varies regularly, there was no designated minimum response rate

percentage. However, for quality data analysis, the appropriate sample size for multiple

regression is 30 - 500 participants (Field, 2018). The goal of this study was to have a minimum

of seventy-five participants coming from various parts of the United States. After reviewing 44

published and 220 created multivariate datasets, a sample size of 58 provided the same result as

the larger samples (Forcino et al., 2015). Therefore, the data should be relevant if this study had

at least fifty-eight participants. Data was collected through a digital survey created on a Google

form distributed as a clickable link. There was a four-week data collection window after which

the data was uploaded to a spreadsheet in Microsoft Excel and IBM SPSS Version 28.0 for

analysis. Quantitative data was collected for adaptability (subdivided into human, social, and

decisional capital) and job satisfaction. For the study's data analysis, the predictor variables were the professional capital elements of adaptability, and the outcome variable was job satisfaction.

<div align="center">Instrumentation and Materials</div>

Quantitative data for this study were collected using a Likert-based survey. The survey used in this study consisted of questions on demographics and statements regarding the relationship between the predictor and outcome variables. Demographic questions included grade level taught, years of teaching experience, the number of years teaching science, the number of different schools and grade levels taught, COVID-19 teaching experience, age, and sex. For this study, the science content area included the following courses: STEM, science, physical science, life science, earth science, physics, chemistry, biology, human biology, environmental sciences, marine science, agriculture/horticulture/forestry, and forensic science. Grade levels were divided into elementary (k-5), middle (6-8), and high school (9-12). Survey respondents selecting the elementary school level were asked not to continue the survey. Survey respondents indicating that they have taught less than five years of science were also asked not to continue the survey, regardless of the total number of years teaching. Data were only analyzed from those who have taught science for at least five years.

Several pre-existing surveys, questionnaires, and scales were used as references in building statements for a newly created survey that addressed all variables in the study. The following resources were used for the designated variables:

1. Adaptability - Career Adapt-Abilities Scale Short Form (CAAS-SF)

2. Autonomy – Teacher-Work Autonomy Scale (TWA) (*Note*: Although autonomy is not a stand-alone variable, questions from this instrument can provide data to support the link between decisional capital and teacher adaptability.)

3. Job Satisfaction – Teaching and Learning International Survey (TALIS)

4. Efficacy – Teacher Self-Efficacy Scale (TSES) and Teacher Self-Efficacy Scale Short

    Form (TSES-SF) (*Note*: Although self-efficacy is not a variable, questions from this

    instrument can provide data to support the link between teacher adaptability and job

    satisfaction.)

The above instruments were selected due to their widespread acceptable use and

psychometric properties. The CAAS-SF has been evaluated in multiple countries for its

construction and reliability. The instrument was found to have an internal consistency range of

acceptable to excellent for each of its subscales and an overall internal consistency of excellent

for the total score in measuring career adaptability (Savickas & Porfeli, 2012; Tien et al., 2012).

When tested among multiple samples, the CAAS-SF achieved complete metric and scalar

invariance supporting its use as a reliable and valid measure of career adaptability (Yu et al.,

2020). The short form has also demonstrated strong psychometric properties of data collected

from various social groups, which may benefit this study (Maggiori et al., 2017; Yu et al., 2020).

The TWA scale is a reliable and valid instrument, particularly with secondary teachers

(Friedman, 2012; Strong, 2012). The limitations of this instrument in assessing elementary

teacher autonomy are not applicable since this research study focused on secondary science

teachers. Cronbach's alpha for the four sections of the TWA ranged from 0.80 to 0.86, indicating

strong reliability. Compared to similar instruments, the TWA is considered the most accurate and

valid tool for measuring teacher autonomy (Gwaltney, 2012; Strong, 2012). Its multidimensional

approach to indicators makes the TWA a more sensitive and comprehensive instrument for

assessing teacher autonomy (Gwaltney, 2012).

Statements on job satisfaction for this study were modeled and modified from the TALIS instrument. This large-scale instrument provides international data on job satisfaction, autonomy, and teacher self-efficacy for lower and upper-secondary-level teachers (NCES, 2019; Zakariya, 2020). Used in five-year cycles by the Organization for Economic Co-operation and Development (OECD), the results from the TALIS are used to help recruit and retain teachers (OECD, 2016). The OECD has surveyed more than 240,000 teachers in almost fifty countries with consistent results.

The final instrument used as a model for this study's survey is the TSES. This teacher efficacy scale is designed to identify teacher difficulties in their everyday professional activities (Tschannen-Moran & Hoy, 2001). The TSES measurement of teacher efficacy has demonstrated good internal consistency and reliability and correlates significantly with job satisfaction (Nie et al., 2012). The overall reliability of both the short and long forms is indicated by their respective 0.90 and 0.94 alpha coefficients. For teacher instruction questions similar to those used in this study, the short and long forms of the instrument have an alpha coefficient of 0.86 and 0.91, respectively. (Tschannen-Moran & Hoy, 2001). Questions modeled after the TSES instrument should provide reliable data for the current study. Survey questions modeled or modified from all four instruments were used for this study's survey.

The Likert-based survey consisted of five sections associated with teacher adaptability: professional experience (7 statements), adaptive space (9 statements), administrative support (7 statements), self-efficacy (8 statements), and job satisfaction (9 statements). The thirty-five Likert-based statements were coded based on their connection to elements of professional capital: human capital (12 statements), decisional capital (13 statements), and social capital (10 statements). Statements on adaptability focused on teacher experience, administrative support,

and adaptive space, such as, "I have control over the teaching materials and instructional resources for my instruction." and "My administration supports and encourages teacher collaboration to generate new ideas and solve problems." (Pearson & Hall, 1993). Statements of self-efficacy relating to adaptability focused on instructional efficacy, such as, "I feel confident modifying my instruction to meet student needs." Job satisfaction statements focused on the predictor variable in terms of the three primary influences, teacher experience, administrative support, and adaptive space. Survey statements about the outcome variable included "I am satisfied with the amount and quality of time to collaborate with other teachers about instruction." and "I am satisfied with the amount of control I have over determining course content." (OECD, 2016).

A five-point Likert scale was used for all survey sections indicating the strength of agreement with each statement. The scale categories were strongly disagree, moderately disagree, neutral, moderately agree, and strongly agree. Some statements were written for negative responses to ensure that participants read the statements accurately and responded accordingly. One optional open-ended question was provided at the end of each section that asked for additional information regarding the subtopic of that section. Internal consistency was assessed on the completed surveys by calculating Cronbach's Alpha and comparing it to the reliability of the original surveys.

Data Collection and Analysis

The data were collected from an online survey released to members of five Facebook groups: Teachers Ask Teachers; Science Teachers; Middle School Science Teachers Unite; Teachers Who Love Science; Middle School Science Teachers. These are public and private teacher forums where the administrators allow member surveys. There were thirty-five Likert-based

statements and five optional open-response questions on the survey. The Likert response scale

for the survey ranges from one to five and is based on the respondent's strength of agreement

with each statement. The scale categories were strongly disagree, moderately disagree, neutral,

moderately agree, and strongly agree.

The quantitative data were analyzed using IBM SPSS version 28.0. Descriptive statistics

were run on the collected data to determine the mean and standard deviation of each survey

statement. Finding the statistical centers for each statement provides a frame of reference for

analyzing and comparing the distinct factors of professional capital that impact teacher

adaptability. Analyzing the strength of the correlation of the factors showed the significance of

predictor variables related to job satisfaction.

Before running any regression, a multicollinearity analysis was used to reveal any

variable co-dependence. Pearson's r was calculated using bivariate correlation to determine the

strength of variable relationships, and covariance was identified using Field's recommendation

of $r > 0.9$ (Field, 2018). Identifying and removing highly correlated variables is critical in

revealing the true significance of other variables. Multiple regression was used to analyze the

strength and significance of variable relationships to determine if professional capital elements of

adaptability influence job satisfaction. Multiple regression aims to find the equation that best

predicts the outcome variable as a function of the predictor variables.

Multiple regression was used to analyze the relationship between the dependent variable,

job satisfaction, and the predictor variables of adaptability, human, social, and decisional capital.

Data analysis was conducted using the mean of scores from the job satisfaction statements and

the mean of scores from the predictor variables statements to determine the individual influence

of each. All adaptability statements were compared to the mean of the outcome variable to

determine the relationship between adaptability and job satisfaction. A bivariate correlation was conducted between each professional capital factor to determine any relationship between these variables that might impact adaptability. This analysis may also help determine if any one element or combination of elements of professional capital have more significant impacts on adaptability than others.

Since multiple regression had more than one predictor variable, there was a line of best fit for each variable. The formula used for multiple regression data analysis is $Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots + \beta_p X_{ip} + E_i$ in which y is the outcome variable and X_{i1}, X_{i2}, and X_{ip} are the predictor variables. β_0 is equal to y when the predictor variables are equal to zero, and β_1, β_2, and β_p are the regression coefficients (Keith, 2019). Testing for multicollinearity can help prevent the inflation of the coefficients in this type of analysis. A table was used to organize the survey data showing the *p* values of the variable relationships. A *p* value of ≤ 0.05 is statistically significant, indicating that the correlation between variables is not likely coincidental. A bivariate correlation was conducted to find variable correlation and linear relationships of the variables using Pearson's *r*. This value was used to calculate the effect size, determining the degree of influence or strength of the variable correlation. Cronbach's alpha was also calculated to determine the internal consistency and reliability of the survey data.

The descriptive statistics analysis examined the relationship between adaptability and teacher sex, age, grade level, years of experience, years of teaching science, and the number of different schools and grades. Since there are multiple covariates, an R-squared and adjusted R-square analysis was conducted to determine the proportion of variance in the outcome variable for each predictor variable while adjusting for the number of predictor variables in the multiple regression model. These data revealed how useful the predictor variables are in predicting the

outcome variable. The data collected on the COVID-19 teaching model experienced by

participants and the open-ended question responses will be used in future qualitative studies to

explore the potential impacts of pandemic teaching on teacher adaptability.

Protection for Participants

The survey was conducted in online forums that permit members to solicit research data.

A thorough explanation of the purpose of the study was provided at the beginning of the survey

to inform participants of their role in the data collection and potential outcomes. Contact

information, including the IRB number, was provided in case participants had concerns or

questions before, during, or after the survey. Finally, a description of how the survey was to be

conducted and the rating scale to be used were described in the survey directions.

To maintain participant anonymity and protect the privacy of their information, no

names, email addresses, or IP addresses were collected during the survey. Participants were also

not asked to supply the names of their district, school, or supervisors. Participation in the survey

was completely voluntary and participants could withdraw at any time during the process

without any penalty or recourse. All data will be stored in a password-protected electronic

format and will be destroyed after the research study is completed. The results of this study

will be used for scholarly purposes only and any information shared will be done

anonymously.

Conclusion

This chapter provided a descriptive and detailed discussion of the quantitative multiple

regression in this research study. The methodology chapter also detailed the data collection

process and the various analysis techniques used to evaluate the results. Descriptive and

inferential statistics were used to analyze all data and determine correlations between

professional capital, adaptability, and teacher job satisfaction. Finally, this chapter

summarized the protections provided for the participants' data collected in the survey.

Chapter 4 will detail the data collected during the multiple regression analysis.

Chapter 4: Results and Findings

Introduction

The purpose of this study was to determine the relationship between teacher adaptability and secondary science teachers' job satisfaction. This study also examined how the elements of professional capital impact teacher adaptability and the resulting influence on job satisfaction. Many prior studies on this topic focused on interviews and qualitative data, while this study used a survey and quantitative analysis with triangulated data from open-response questions. This study's online survey yielded over 4000 data points and more than 200 open responses. The collective findings of this study present a correlational model of the relationships between professional capital, adaptability, and teacher job satisfaction. This study expanded upon the findings of previous studies that examined the influence of professional capital on job satisfaction. This data analysis was designed to provide information to help future initiatives promote teacher retention by enhancing job satisfaction through professional capital and adaptability.

Study Design

This study used quantitative methodology by conducting an online survey modeled after pre-existing reliable and valid questionnaires. The survey was created by the researcher and used to collect Likert scale quantitative data for this study. Modified and modeled statements were based on the CAAS-SF, TWA, TALIS, TSES, and TSES-SF. The survey was created by categorizing research findings into the three elements of professional capital and the specific aspects found within each element. The survey consisted of 35 Likert scale statements divided into five sections associated with teacher adaptability: professional experience (7 statements), adaptive space (9 statements), administrative support (7 statements), self-efficacy (8 statements), and job

satisfaction (9 statements). Additionally, the thirty-five Likert-based statements were coded based on their connection to elements of professional capital: human capital (12 statements), decisional capital (13 statements), and social capital (10 statements). This chapter provides the findings of the survey as they relate to the research questions guiding this study.

A five-point Likert scale was used for all survey sections, indicating the strength of agreement with each statement. The scale categories were strongly disagree, moderately disagree, neutral, moderately agree, and strongly agree. Some statements were written for negative responses to ensure that participants read the statements accurately and responded accordingly. One optional, open-ended question was provided at the end of each section that asked for additional information regarding the subtopic of that section. The open-ended responses were coded based on their connections to the elements of professional capital and adaptability. The data from the coding was used to triangulate the results from the Likert-based statements.

The participants in this study were members of five Facebook groups: Teachers Ask Teachers; Science Teachers; Middle School Science Teachers Unite; Teachers Who Love Science; Middle School Science Teachers. A total of 107 teachers responded to the survey; however, five respondents' data were removed before analysis. Three respondents were from outside the United States, and two others did not fit the criteria of teaching time laid out in the study parameters. Since responding to each Likert statement was required to continue to the next section of the survey, all participants responded to all statements. The open-ended questions were optional, and 54 teachers answered the first question about professional knowledge and experience, 45 answered the second question about adaptive space, 44 answered the third question on administrative support, 32 answered the fourth question on self-efficacy, and 34

answered the final question about job satisfaction. For additional reliability, these responses were

used to support or challenge the consistency of the data collected from the Likert-based

statements.

The survey data were assessed for reliability using Cronbach's alpha and analyzed through

multiple regression and the Pearson correlation coefficient. A multicollinearity test was used to

remove any covariates, and an R-square and adjusted R-square analyses were conducted to

account for the numerous variables in the study. Furthermore, correlations between each element

of professional development, individual survey categories, and participant demographics were

analyzed to determine relationships between variables.

Research Questions

This study aimed to examine the relationship between teacher adaptability and the job

satisfaction of secondary science teachers. The questions that were investigated in this study

were:

1. What are the components of professional capital that influence teacher adaptability?

2. How does teacher adaptability influence secondary science teachers' job satisfaction?

Survey statements were coded for adaptability factors and professional capital elements to

address both research questions presented in this study.

Findings

The findings for this study consisted of descriptive statistics, including participant

demographics, and quantitative data from the 35 Likert scale statements and the five open-ended

responses from the online survey. Descriptive data, including participant demographics and

teaching statistics, were collected at the end of the survey. Inferential data based on professional

capital and adaptability were collected concerning teacher job satisfaction. The inferential data

from the Likert-based statements were analyzed with two different correlation tests using

multiple regression. The open-ended responses were used to triangulate the comprehensive data

from the survey.

Descriptive Findings

The online survey conducted for this study received 107 individual participant responses.

Two participants were eliminated based on their failure to meet the survey criteria for the

number of teaching years. Three other participants were eliminated due to their teaching outside

the United States. These eliminated data points resulted in a final sample size (N) of 102

participants. The data presented in this section created a demographic profile of the secondary

science teachers who participated in this study. Of the 102 participants, 93.1% were female and

6.9% were male. As evidenced in Table 1, most participants were middle school teachers

(70.6%) between 35-54 years of age (70.9%). Over 40% of the participants had been teaching for

less than fifteen years, with nearly 20% having taught for over twenty years. While over half of

the participants (51.5%) had taught in 2-3 different schools, nearly 70% had taught 2-5 different

grade levels. Survey respondents were also asked to indicate the different instructional methods

used during the COVID-19 pandemic. This data, along with a complete qualitative analysis of

the open-ended responses, were not analyzed in this report. Instead, the data will be used in

future studies.

Table 1

Profile of Participant Demographics

Demographic Variable	N	Frequency	Percent
Sex	102		
Male		7	6.9
Female		95	93.1
Age Range	102		
25-34		7	6.8
35-44		31	30.1
45-54		42	40.8
55-64		19	18.4
65-74		2	1.9
75 and over		1	1.0
Grade Level	102		
Middle School		72	70.6
High School		30	29.4
Number of years teaching	102		
Less than 5		NA	NA
5-9		16	15.5
10-14		27	26.2
15-19		19	18.4
20-24		20	19.4
25-29		7	6.8
30-34		9	8.7
35-39		2	1.9
40 or more		2	1.9
Number of schools taught in	102		
Only one		16	15.5
2-3		53	51.5
4-6		25	24.3
7-10		7	6.8
More than ten		1	1.0
Number of grades taught	102		
Only one		4	3.9
2-3		39	37.9
4-5		32	31.1
6-7		16	15.5
More than seven		11	10.7

Participants were asked to indicate which level of secondary science they taught, middle or high school, based on the researcher's questioning whether the different work environments had an impact on teacher adaptability or if adaptive skills had any influence on the level of science the participants chose to teach. The number of years teaching, schools taught in, and grade levels were included in the demographics of the survey based on the notion that varied teaching environments may impact teachers' adaptability or that their adaptive skills may influence their decision to change schools or grade levels during their careers.

The purpose of surveying participants who have more than five years of teaching experience was to eliminate educators who were new to the profession. Knowing that new teachers have many extraneous factors that could influence their responses, such as teacher workshops, inexperience, professional learning curve, and general new teacher stressors, these teachers were eliminated from the data. These factors would less influence veteran teachers; consequently, their responses to the statements are more apt to be based on the specific predictors of the survey. Only sixteen teachers in the survey had taught for less than ten years, and only seven participants were under the age of thirty-five. This means that most of the participants have ample experience in education to respond appropriately to the survey statements. Only sixteen teachers have taught at a single school, and just four teachers have taught a single grade. By having experience in multiple schools and grades, most of the participants have experienced more opportunities requiring adaptive skills, further improving the potential reliability of the data.

Instrument Reliability

A multicollinearity test was conducted on each predictor variable and its correlation with the outcome variable. Table 2 details the results of this correlation analysis. The results indicated

an elevated level of collinearity between self-efficacy and human capital. While most variables

were between .10 and .20, self-efficacy had a tolerance of .069, and human capital had a

tolerance level of .039. Tolerance values of less than .20 indicate potential collinearity and less

than .10 can indicate serious issues (Field, 2018; Keith, 2019). In addition, the variance inflation

factor (VIF) for both variables was the highest of all predictors. The VIF increases with higher

degrees of multicollinearity, with values over ten considered to demonstrate extreme levels of

correlation (Field, 2018). While self-efficacy was slightly above this standard, with an elevated

VIF of 14.4, human capital exceeded the threshold of ten with a value of 25.6, indicating an

extreme level of collinearity. VIF values between six and ten, as found in the remaining

variables, should also be evaluated for potential collinearity (Keith, 2019). These results were

considered and accounted for during further data analyses.

Table 2

Multicollinearity of Predictor Variables

	Collinearity	
	Tolerance	**Variance Inflation Factor**
Professional Knowledge and Experience	.151	6.6
Adaptive Space	.225	4.4
Administrative Support	.136	7.4
Self-efficacy	.069	14.4
Human Capital	.039	25.6
Social Capital	.153	6.5
Decisional Capital	.160	6.3

The reliability of each research study predictor was determined using Cronbach's alpha. Since the survey statements were categorized in two separate ways, Cronbach's alpha was calculated for the statements based on their professional capital element and their adaptability factor. This dual evaluation of the survey items provided an additional layer of reliability for the instrument. As indicated in Table 3, the statements grouped by their professional capital predictor resulted in a reliability score of .86 for human capital statements 1-3, 5-6, 24-29, and 32, .81 for social capital statements 13-15, 19-22, 33-34, and 39, and .86 for decisional capital statements 4, 8-12, 17-18, 30, and 35-38. Given that the standard measure of Cronbach's alpha identifies .70 as acceptable and .80-.90 as good reliability, the results of the survey statements when grouped by professional capital predictors indicated a good level of reliability for all three elements.

Although the reliability rating was somewhat lower when the statements were analyzed based on their adaptability factor, most of the results still indicated an acceptable or good level of reliability. The professional knowledge and experience statements (1-6) demonstrated an acceptable reliability rating of .73. The administrative support statements (16-22) had a good reliability rating of .80. The lowest level of reliability was achieved by the adaptive space statements (9-15) with a rating of .64, which is lower than the level of acceptability. However, the self-efficacy statements (24-30) had the highest rating of the adaptability factors, with a Cronbach's alpha of .82, indicating good reliability. When the Likert statements were analyzed collectively, they received a rating of .87, indicating that the conducted survey had very good overall reliability. Given the low collinearity tolerance of the human capital (.036) and self-efficacy (.061) results, a separate reliability test was conducted without these variables. With both variables removed, the test resulted in a Cronbach's alpha rating of .86, which is still

considered good on the reliability scale. When the test was conducted with only one of these variables removed, the results were the same for both. The rating with either, but not both, removed was .90, which is higher reliability than any other variable combination.

Table 3

Reliability of Predictor Variables and Survey Items

Predictor	Survey Items	Cronbach's Alpha
Professional Capital Elements		
Human Capital	1-3, 5-6, 24-29, 32	.86
Social Capital	13-15, 19-22, 33-34, 39	.81
Decisional Capital	4, 8-12, 17-18, 30, 35-38	.86
Adaptability Factors		
Professional Knowledge & Experience	1-6	.73
Adaptive Space	9-15	.64
Administrative Support	16-22	.80
Self-efficacy	24-30	.82
All predictors	All statements except open-ended questions (7, 16, 23, 31, 40)	.87
Inter-item Correlation Considered		
Without human capital and self-efficacy		.86
Without human capital		.90
Without self-efficacy		.90

Note: Cronbach's alpha was calculated with and without human capital and self-efficacy based on the results of their inter-item correlation.

Compared to the original instruments from which its statements were derived, the survey

in this study produced results that were in range with previously established reliabilities. The

overall Cronbach's alpha for this study's survey was .90, whereas the original instruments had

ratings of .91-.94 for the CAAS-SF, .84-.91 for the TWA, .84-.97 for the TALIS, and .90-.94 for

the TSES and TSES-SF (Gwaltney, 2012; Maggiori et al., 2017; NCES, 2019; Nie et al., 2012;

Strong, 2012; Tschannen-Moran & Hoy, 2001; Yu et al., 2020; Zakariya, 2020). For the

individual sections of the survey, there were comparable results between this study's reliability

and that of the original questionnaires. The subscales of the CAAS-SF test for adaptability had a

reliability range of .64-.89, whereas this study reported a Cronbach's alpha of .64 for adaptive

space and .86 for decisional capital (Maggiori et al., 2017; Yu et al., 2020). Collaboration

sections of the TALIS demonstrated a reliability of .72-.81, while this study's social capital

reliability rating was .81 (NCES, 2019; Zakariya, 2020). Finally, self-efficacy, as measured by

the TALIS resulted in a Cronbach's alpha of .74-.77. The survey statements from this study

showed a reliability of .82. Although there is some variation between the reliability of the current

study and the original instruments, the overall results of this study, and its sections, demonstrated

a good to excellent Cronbach's alpha rating of reliability.

Once the reliability of the survey items was determined, additional descriptive statistics

were also reviewed for reliability. In Table 4, the mean, standard deviation, and coefficient of

variation for each predictor are indicated. These measures were based on the Likert responses

ranging from strongly disagree (1) to strongly agree (5). Higher mean numbers represent a more

positive response to the variable. Responses to the negatively worded statements were adjusted

to fit the scale before data analysis. The highest mean (4.3) was for the professional knowledge

and experience statements, indicating a positive agreement with these statements. The lowest

mean (3.6) was in response to the job satisfaction statements, indicating a slightly positive

response.

Table 4

Means and Standard Deviations for Predictor Variables

Predictor	Mean	Standard Deviation	Coefficient of Variation
Adaptability Factors			
Professional Knowledge & Experience	4.3	0.53	0.12
Adaptive Space	4.1	0.55	0.13
Administrative Support	3.8	0.82	0.22
Self-Efficacy	3.9	0.62	0.16
Job Satisfaction	3.6	0.77	0.21
Professional Capital Elements			
Human Capital	4.1	0.53	0.13
Social Capital	3.7	0.69	0.19
Decisional Capital	4.0	0.69	0.17

Note: A five-point Likert scale was used for all survey sections indicating the strength of agreement with each statement. The scale categories range from strongly disagree (1) to strongly agree (5). Higher numbers represent a more positive response to the variable.

The standard deviation and coefficient of variation were low for most survey categories.

Administrative support and job satisfaction show the most considerable degrees of variation with

0.22 and 0.21, respectively, indicating a wider dispersion of the data points. These two

components also had two of the lowest means, indicating a more neutral response to the survey

statements. Self-efficacy and social capital demonstrated a slightly positive response to the

survey statements with a mean of 3.9 and 3.7, respectively. The smallest degrees of variation

were found in professional knowledge and experience, adaptive space, and human capital,

indicating a narrow dispersion of the data points. These components had the highest means (4.1-

4.3), indicating a positive response to the survey statements. Decisional capital also

demonstrated a slightly positive response to the survey statements with a mean of 4.0.

Inferential Findings

A correlation analysis was conducted on all the predictor variables of job satisfaction.

The results were analyzed individually and as a collective of adaptability factors and professional

capital elements. The details of these results are shown in Table 5. The correlational coefficient

for each variable was determined by calculating Pearson's *r*. Individually, the adaptability factors

administrative support and adaptive space had the strongest result with .744 and .688,

respectively. For the elements of professional capital, social and decisional capital demonstrated

a strong correlation with Pearson's *r* values of .815 and .839, respectively. The correlation

between decisional capital and job satisfaction was the strongest of all variables, even stronger

than the combination of all adaptability factors. Professional knowledge and experience was the

only variable indicating a weak correlation with a value of .305, and self-efficacy revealed a

correlation slightly above the moderate level with a .502 coefficient. With a moderate level of

.451, human capital demonstrated the weakest correlation out of the professional capital

elements. All variables had a positive correlation with job satisfaction.

Table 5

Correlation Between Predictor Variables and Job Satisfaction

Predictor	Pearson's r	p value
Adaptability Factors		
Professional Knowledge & Experience	.305	.002 *
Adaptive Space	.688	<.001 *
Administrative Support	.744	<.001 *
Self-efficacy	.502	<.001 *
Model of all adaptability factors	.822	<.001 *
Professional Capital Elements		
Human Capital	.451	<.001 *
Social Capital	.815	<.001 *
Decisional Capital	.839	<.001 *
Model of all professional capital elements	.924	<.001 *
All inferential predictors (Adaptability factors and professional capital elements)	.986	<.001 *
Demographics		
Sex	.144	.150
Age	-.042	.676
Grade Level	.023	.815
Number of years teaching	-.072	.474
Number of schools taught in	-.088	.381
Number of grades taught	.084	.403

Note: *Correlation is significant at the 0.01 level (2-tailed).

When analyzed collectively, the adaptability factors showed a strong correlation of .822, while the collective professional elements demonstrated an exceptionally strong correlation with a Pearson's *r* value of .924. When all predictor variables were included in the analysis, the correlation coefficient was .986. As indicated in Table 5, most demographic variables had a negative correlation coefficient, and none showed any significant correlation. The significance of each relationship was determined by the p–value. All predictor variables demonstrated a statistical significance in their correlation with job satisfaction. Except for the demographic variables, all predictor variables revealed a significant correlation at the 0.01 level. With a significance of .002, professional knowledge and experience was the only variable whose *p* value was above .001.

Table 6

Summary of Regression Model Strength

Predictor	R - Square	Adjusted R-square	Std. Error of the Estimate
All inferential predictors (Adaptability factors and professional capital elements)	.973	.971	.130

Note: Dependent (outcome) variable – job satisfaction

Since the Pearson correlation and R-square values tend to become inflated as more variables are added, an adjusted R-square was calculated to quantify the correlation more accurately between the considerable number of variables. The R-square for all inferential predictors was .973 and the adjusted R-square was .971. The difference between the R-square and the adjusted R-square values for all the individual predictors was less than .10, indicating that the correlation was not affected by the considerable number of variables in this study.

In addition to analyzing the relationship between the predictor and outcome variables, a bivariate correlation was conducted to determine the relationship between the predictor variables. Pearson's *r* and the *p* value were calculated to evaluate the inter-item correlation between the adaptability factors and the elements of professional capital. These data are detailed in Tables 7 and 8. The results of the correlation between the predictor variables and adaptability factors are found in Table 7, while the results of the correlation between the predictor variables and elements of professional capital are listed in Table 8. All relationships in both tables had statistical significance at the .01 level except for the correlation between professional knowledge and experience and social capital. However, this relationship still showed significance at the .05 level with a *p* value of .015.

Table 7

Inter-item Correlation of Predictor Variables and Adaptability Factors

	Professional Knowledge and Experience		Adaptive Space		Administration Support		Self-Efficacy	
	Pearson's *r*	*p* value	Pearson's *r*	*p* value	Pearson's *r*	*p* value	Pearson's *r*	*p* value
Professional Knowledge and Experience			.253	.010*	.268	.006*	.575	<.001*
Adaptive Space	.253	.010*			.611	<.001*	.316	.001*
Administrative Support	.268	.006*	.611	<.001*			.418	<.001*
Self-Efficacy	.575	<.001*	.316	.001*	.418	<.001*		
Human Capital	.807	<.001*	.287	.003*	.346	<.001*	.915	<.001*
Social Capital	.240	.015	.609	<.001*	.896	<.001*	.474	<.001*
Decisional Capital	.383	<.001*	.848	<.001*	.717	<.001*	.398	<.001*
Correlational Mean	.421		.477		.543		.516 .436**	

*Note: *Correlation is significant at the 0.01 level (2-tailed).
**Mean of self-efficacy correlation with human capital removed to account for collinearity.

The strongest inter-item relationship was between human capital and self-efficacy with a Pearson's *r* value of .915, indicating a very strong positive correlation. These two predictors also showed high collinearity when paired with the outcome variable of job satisfaction. When the *r* value for human capital was removed, the mean for self-efficacy dropped from a slightly strong correlation of .516 to a more moderate level of .436. For these reasons, Cronbach's alpha was

calculated with each, and both removed to determine their individual and collective impact on the reliability of the survey instrument. Other variable pairs that revealed a strong correlation of more than .700 were professional knowledge and experience and human capital (.807), decisional capital and adaptive space (.848), social capital and administrative support (.896), and decisional capital and administrative support (.717). Strong correlations were revealed between professional knowledge and experience and self-efficacy (.575), administrative support and adaptive space (.611), and social capital and adaptive space (.609).

The mean of each adaptability factor was calculated to examine the cumulative influence of each predictor variable on the outcome variable, job satisfaction. Except for its relationship with human capital, professional knowledge and experience showed the lowest inter-item correlation with a moderate mean of .421. The relationship between professional knowledge and experience and decisional capital was slightly moderate with an r value of .383. The remaining variables adaptive space, administrative support, and social capital showed a weak correlation with r values of .253, .268, and .240, respectively. However, administrative support demonstrated the highest degree of inter-item correlation with a slightly strong mean of .543. Concerning administrative support, half of the predictor variables had a correlation coefficient greater than .600, indicating a strong relationship. Adaptive space correlated at .611, social capital at .896, and decisional capital at .717. Self-efficacy (.418) and human capital (.346) had a moderate correlation with administrative support, while professional knowledge and experience (.268) revealed a weak relationship with administrative support. From weakest to strongest, the mean of their Pearson correlation revealed that professional knowledge and experience (.421) had the lowest mean followed by self-efficacy (.436), adaptive space (.477), and finally administrative support with a somewhat strong correlation of .543.

An inter-item correlation was also conducted between the predictor variables and the elements of professional capital. The relationships between the professional capital elements and adaptability factors from Table 7 are mirrored in Table 8 with the addition of the correlation coefficients for the relationships between each professional capital element. Decisional and social capital was the only relationship that indicated a strong correlation. Pearson's *r* for these variables was .614. The relationships between human and social capital and between decisional and human capital demonstrated a slightly moderate correlation with an *r* value of .383 and .369, respectively. The mean of their correlation coefficients was also calculated for the professional capital elements. Each element demonstrated a mean of strong correlation when all variables were considered. Human capital had a mean of .518, social capital had a mean of .536, and decisional capital had the highest mean of .555. When the collinearity between human capital and self-efficacy was accounted for, the mean for human capital dropped to a more moderate correlation of .438.

Table 8

Inter-item Correlation of Predictor Variables and Professional Capital Elements

	Human Capital		Social Capital		Decisional Capital	
	Pearson's r	**p value**	**Pearson's r**	**p value**	**Pearson's r**	**p value**
Professional Knowledge and Experience	.807	<.001*	.240	.015	.383	<.001*
Adaptive Space	.287	.003*	.609	<.001*	.848	<.001*
Administrative Support	.346	<.001*	.896	<.001*	.717	<.001*
Self-Efficacy	.915	<.001*	.474	<.001*	.398	<.001*
Human Capital			.383	<.001*	.369	<.001*
Social Capital	.383	<.001*			.614	<.001*
Decisional Capital	.369	<.001*	.614	<.001*		
Correlational Mean	.518 .438**		.536		.555	

Note: *Correlation is significant at the 0.01 level (2-tailed).
**Mean of self-efficacy correlation with human capital removed to account for collinearity.

Although the qualitative value of the survey's open-ended question responses will be analyzed in future studies, the answers given by participants were tallied to provide additional quantitative data to triangulate the survey results. These data are detailed in Table 9. There was a total of 209 responses to the optional open-ended questions. All five questions asked participants to respond to the connection between the section topic and adaptability. The first question about

professional knowledge and experience was answered by 54 participants, 45 answered the

second question about adaptive space, 44 answered the third question on administrative support,

32 answered the fourth question on self-efficacy, and 34 answered the final question about job

satisfaction.

Most of the data from open responses supported the correlation between variables

demonstrated with Pearson's *r*. In many cases, the percentage of comments that connected

predictor variables represented those variables' correlation. In other words, the stronger the

correlation, the higher percentage of related comments. For example, 50 percent of participants

commented on connecting their teaching experience to human capital; the correlation coefficient

for these variables was high at .807. Likewise, self-efficacy was strongly correlated with human

capital with an *r* value of .915, and 47 percent of the comments connected these two variables.

Table 9

Open-Response Correlation to Human, Social, and Decisional Capital

	Human Capital		Social Capital		Decisional Capital		Total Responses
	Frequency	**Percent**	**Frequency**	**Percent**	**Frequency**	**Percent**	
Question 7: Teaching experience	27	*50*	5	*9*	25	*46*	54
Question 16: Adaptive Space	12	*27*	26	*58*	28	*62*	45
Question 23: Administrative Support	20	*45*	9	*20*	14	*32*	44
Question 31: Self-efficacy	15	*47*	4	*13*	17	*53*	32
Question 40: Job Satisfaction	9	*26*	11	*32*	24	*71*	34
Adaptability Total (Q7, Q16, Q23, Q31)	74	*42*	44	*25*	84	*48*	175
Total	83	*40*	55	*26*	108	*52*	209

Note. The response could have been positive or negative. Only responses with direct comments related to aspects of the professional capital elements were included in the data.

Responses connecting adaptive space with each element of professional capital were also in line with Pearson's correlation. Decisional capital was connected in 62 percent of the responses, while social and human capital were mentioned in 58 and 27 percent, respectively.

The correlation between these variables shows a similar relationship. The coefficient between adaptive space and decisional capital was high at .848, while the *r* values for social and human capital were lower at .609 and .287, respectively. Additionally, participants related job satisfaction to their decisional capital in 71 percent of the responses, although aspects of human capital were only mentioned in 26 percent of responses. The correlation between these variables played out similarly in their Pearson coefficient. Job satisfaction had a high *r* value of .839 concerning decisional capital and a lower value of .450 concerning human capital.

On the other hand, some of the participant responses revealed data that challenged the survey results. For example, in the Likert results, administrative support highly correlated with social (.896) and decisional (.717) capital. However, only 20 percent of the comments connected administrative support with social capital and 32 percent with decisional capital. Although the correlation between human capital and administrative support was low at .346, over 45 percent of the responses connected these two variables. Teaching experience and self-efficacy had some of the most remarkable variations between the Likert results and the open-ended responses. Teachers' professional knowledge and experience had a slightly moderate correlation with decisional capital with an *r* value of .383; however, 46 percent of the open responses made a connection between these variables. Likewise, self-efficacy was mentioned in relation to decisional capital by 53 percent of the participants, although the correlation between these variables was slightly moderate at .398.

Although some survey comments provided supportive data for the correlation between variables, others provided information that challenged the results of the Likert data. When examining the cumulative results of the open-ended questions, the characteristics of adaptability were connected to human capital by 42 percent of the responses, social capital by 25 percent, and

decisional capital by 48 percent. Additionally, job satisfaction was mentioned in relation to human capital by 26 percent of the participants, social capital by 32 percent, and decisional capital by 71 percent. The Likert results for job satisfaction were similar to the open-ended responses relating to adaptive space. Further qualitative analysis of the participant comments and the potential reasons behind the discrepancy of the Likert results will be conducted in future studies. The quantitative analysis provided here will be further discussed in chapter five.

Summary of Findings

The participants in this study consisted of 102 secondary-level science teachers across the United States. These educators have taught science in grades 6-12 for at least five years. Chapter four presented demographic data, results of statistical analysis, and psychometric properties of the survey conducted in this study. Descriptive and inferential findings were provided, and quantitative data was calculated for the open-ended responses provided by the participants. The internal consistency of the survey data was determined by calculating Cronbach's alpha, and the reliability of the instrument was shown to be high with a value of .90. The reliability of individual sections ranged from .64 to .86 with only two areas, professional knowledge and experience and adaptive space, falling below .70.

Participant demographics revealed no correlation or statistical significance to job satisfaction. However, all other predictor variables were individually significant at the 0.01 level with a Pearson's *r* value between .305 and .839. The strongest correlation to job satisfaction resulted from decisional and social capital and the weakest correlation resulted from human capital and professional knowledge and experience. Table 10 summarizes the correlation coefficients for each inferential predictor and their relationship with job satisfaction.

Table 10

Job Satisfaction Pearson Correlations for Predictor Variables in Order of Significance

Variables	Pearson's *r*
All Inferential Predictors	.986
Professional Capital Elements (combined)	.924
Decisional Capital	.839
Adaptability Factors (combined)	.822
Social Capital	.815
Administrative Support	.744
Adaptive Space	.688
Self-efficacy	.502
Human Capital	.451
Professional Knowledge & Experience	.305

Note: Correlation is significant at the 0.01 level (2-tailed) for all variables.

Self-efficacy and human capital were shown to have collinearity; therefore, correlations were run with and without these variables to determine their effects. Although significant, these variables had two of the weakest correlations with job satisfaction. Other inter-item correlations revealed the strongest relationship between social capital and administrative support with a Pearson's value of .896, followed closely by the decisional capital and adaptive space correlation of .848. The strongest mean correlation was in relation to decisional capital at .555 and the weakest was with professional knowledge and experience at .421. The latter variable's coefficient with social capital, adaptive space, and administrative support were .240, .253, and .268, respectively.

This study's results supported previous research and findings while presenting new data. This chapter reviewed the descriptive and inferential findings related to the research questions. The qualitative information collected during the open responses was converted to quantitative data for triangulation. Chapter five will provide a detailed discussion of the data, limitations of the study, implications for the educational field, and recommendations for future research.

Chapter 5: Conclusions, Implications, and Recommendations

Introduction

The United States is currently experiencing a severe teacher shortage. Discussions of how to retain teachers are part of the daily conversations in the world of education. Many teachers are leaving the profession due to a lack of job satisfaction (Ng et al., 2022). We are currently in a 15-year decline and experiencing the lowest teacher job satisfaction ever recorded (Will, 2022). Numerous internal and external factors can influence a teacher's job satisfaction. Federal policies, local mandates, and district-level initiatives are influences that can seldom be controlled or moderated within a school's climate or a teacher's classroom (Aldridge & Fraser, 2016; Wong & Heng, 2009). However, aspects such as administrative support, availability of collaboration, and opportunities for instructional autonomy can be more closely monitored and supported within an individual school (Yolcu & Akar-Vural, 2020; Yoon & Kim, 2022). If school districts and administrators can better address those factors that influence teacher job satisfaction, their leadership could potentially improve attrition and reduce the ongoing and worsening teacher shortage in this country.

One group of teachers that is of particular concern in the current teacher shortage is secondary science teachers. These teachers leave the profession more often and earlier in their careers than nearly all other content areas. The odds of a science teacher leaving within five years are 26% higher than similar non-science teachers (Allen & Sims, 2017). Having often earned advanced degrees, these educators can find higher-paying jobs outside the classroom more easily than other teachers. With STEM jobs in high demand today, losing secondary science teachers in our classrooms could have long-lasting negative impacts. Although it is essential to evaluate and improve the retention of all teachers, examining the factors that

could decrease the attrition of secondary science teachers seems particularly important today. One way to do this is to analyze the factors that can positively influence teacher job satisfaction.

One factor that could impact teachers' job satisfaction is their ability and willingness to adapt to the many changes in their profession. This study examined adaptability through the lens of professional capital, thus exploring how the ability to adapt can stem from a teacher's human, social, and decisional capital. Data collected from the survey revealed that all three elements positively correlated with job satisfaction and that social and decisional capital had a strong correlation. Having high Pearson's r values of .815 and .838, social and decisional capital showed the highest correlation with job satisfaction of any predictor tested. The strength of their inter-item correlation was .614 indicating a strong positive relationship and that these elements depend on each other to some extent. These results provided new insight into how job satisfaction might be achieved for secondary science teachers. The elements of professional capital had not been previously studied collectively as the source of teacher adaptability and its influence on job satisfaction. The data from this study suggested that by building and supporting teachers' professional capital, school administrators can facilitate teachers' ability to adapt to change and improve their job satisfaction.

Constant change in the education system creates daily opportunities for teachers to practice adaptability. Curriculum changes, policy updates, new administrations, and global pandemics can create havoc in a teacher's classroom. Teachers must constantly adapt to the complex and ever-changing world of education, and research has shown that adaptability is a positive predictor of a healthy work environment (Collie et al., 2020). Research has also revealed that developing and supporting a positive adaptive space can facilitate productive

adaptability and improve a worker's job satisfaction (Arena, 2018). Data collected in this study isolated aspects of that adaptive space to provide better insight into how they might influence job satisfaction. Inter-item correlation analysis revealed strong relationships between adaptive space and administrative support and between adaptive space and social and decisional capital. When associated with adaptive space, social capital had a correlation coefficient of .609, administrative support a .611, and decisional capital expressed a very strong correlation with a coefficient of .848, indicating that all three are important to building adaptive space.

With administrative support and social and decisional capital demonstrating strong correlations with adaptive space and job satisfaction, data implied that these predictors are the most critical connections between teacher adaptability and job satisfaction. Complexity theory supports this research by stating that the relationship between an organism (a teacher) and its environment (the school) is a dynamic and iterative process in which the organism and the environment must change together to evolve and survive (Morrison, 2006). Schools need to develop and support a strong sense of professional capital to build a positive adaptive space for teachers to feel confident and be skilled in adaptability. Furthermore, improved professional capital can increase job satisfaction and potentially decrease teacher attrition (Melesse & Belay, 2022).

Professional capital consists of three elements: human, social, and decisional capital. Teachers are directly impacted by multiple facets within each element, such as the professional knowledge and experience of human capital, the collaboration of teachers in social capital, and the instructional autonomy found within decisional capital. Overlapping many of these areas, you will find administrative support as an influencing co-factor (Collie &

Martin, 2017; Munda, 2021). Administrative support has also been linked to teachers'

individual and collective sense of self-efficacy, key components to creating a positive

adaptive space within the school system (Nordick, 2017).

Unlike prior studies, this study's survey data demonstrated that administrative support

and social and decisional capital were more important to a teacher's job satisfaction than self-

efficacy and human capital (Noormohammadi, 2014). Whether teachers feel confident was not

as critical to their job satisfaction as having administrative support, peer collaboration, and

instructional autonomy. These results supported the concept of complex systems and the

interdependency of their agents (Arena, 2018). These data also demonstrated the importance

of the relationship between teachers and the school environment. When analyzed for

correlation with job satisfaction, professional knowledge and experience and human capital

only had coefficients of .305 and .451, respectively. In contrast, adaptive space and

administrative support had higher values of .688 and .744, respectively.

The data showed similar results when examining the relationships between these

factors and adaptive space. The correlation between professional knowledge and experience

and adaptive space was only .253, and between human capital and adaptive space was only

.287. In addition, self-efficacy had a correlation of .316 with adaptive space, challenging a

2018 study in which data claimed that self-efficacy was a strong predictor of job satisfaction

(Loughland & Alonzo, 2018). In contrast, adaptive space had much stronger correlations with

administrative support and decisional capital with effect sizes of .611 and .848, respectively.

These data predict that regardless of their level of knowledge and skills or their sense of self-

efficacy, teachers will likely be more adaptable when given administrative support and

adaptive space for collaboration and decision-making.

By promoting and supporting a productive level of professional capital, school systems and their administrators can create a positive adaptive space in which teachers have positive self-efficacy and adaptability skills. This educationally conducive environment promotes greater job satisfaction and could improve teacher retention (Pearson & Hall, 1993). Some prior studies have focused on analyzing the overarching influence of professional capital on teacher job satisfaction or the relationship between job satisfaction and teacher retention. However, more research was needed on the connection between building professional capital to create an adaptive space or supporting teacher adaptability to increase job satisfaction. This study provided data to support the relationship between professional capital, adaptability, and job satisfaction by examining the correlation between these three variables as determined by the survey responses of secondary science teachers across the United States.

Discussion

The purpose of this study was to determine the relationship between teacher adaptability and secondary science teachers' job satisfaction through the lenses of complexity theory and professional capital. The data collected in this study's survey provided valuable information that helped to answer the questions:

1. What are the components of professional capital that influence teacher adaptability?

2. How does teacher adaptability influence secondary science teachers' job satisfaction?

Descriptive Findings

The descriptive findings from the survey indicated that most participants were female as only 6.9% were male. Given that the surveyed profession is education, this was not entirely unexpected, although the data was more slanted than anticipated. The reason for the skewed participation could be a result of the online platform used. It could be hypothesized that more

females are part of the Facebook forums than men, resulting in a greater number of female respondents. As this data is unavailable, this hypothesis would be difficult to test. There were also more middle than high school teacher participants, which could be explained with a similar hypothesis. When searching for science teacher forums, there were numerous groups specifically for middle school teachers. However, only a few were for high school, suggesting that middle school science teachers may be more active in online forums.

With wide ranges of age and experience, the data collected in the survey provided a well-rounded representation of secondary science teachers across the United States. Over seventy percent of the participants were between 35 and 55 years of age, and less than one percent were under thirty-five, which provided data from potentially more experienced teachers. Although more than forty percent had taught for less than fifteen years, twenty percent had taught for over twenty years, and less than two percent had fewer than ten years of experience. The survey requirement of participants having at least five years of teaching experience was critical for having respondents with a greater possibility of adaptive opportunities. Most respondents had taught in multiple schools (84.5%) and grade levels (96.1%), with less than two percent teaching at only one school and less than half a percent teaching in only one grade level. This data suggest that the respondents likely have experience with change that would result in the need for adaptability. Again, the participants' experience range provided additional confidence in the data. If the participants were too similar, the data might be biased or not inclusive of a larger sample. Variations in participant demographics increased the likelihood that the results of this study could be generalized and applied to groups other than secondary science teachers.

Given the high level of instrument reliability based on Cronbach's alpha, the data from this study's survey were comparable to previous questionnaires used to measure the predictor variables. Since the questions were categorized and tested in multiple ways for reliability, there was a high confidence level in the overall results. Additionally, two variables that demonstrated collinearity, self-efficacy and human capital, were considered when conducting the reliability test. An inter-item correlation was conducted without either of these variables and again with each one individually. The lowest test, with both included, had a Cronbach's alpha of .86. When the data was tested with each variable individually, the reliability rating improved to .90. Accordingly, when the collinearity of these variables was accounted for, the reliability of the survey instrument was even higher. This indicated that even with potential collinearity issues from two of the predictor variables, the reliability of the survey instrument still provided a high level of confidence in the overall results.

The standard deviation and coefficient of variation of the predictor variables further support the reliability of the data. The largest standard deviation was found in the responses to administrative support (0.82) and job satisfaction (0.77). Their coefficients of variation were also the highest with administrative support being 0.22 and job satisfaction 0.21. These results were not surprising as there are many differences in administration leadership styles, school settings, and numerous other factors that can influence and create variability in these two factors. These two variables are also likely to be more influenced by external factors outside teachers' control. Naturally, this would lead to greater variation in participants' responses and make the mean results slightly less reliable than some other variables.

On the other hand, the smallest standard deviation of 0.53 was found in both human capital and professional knowledge and experience, with adaptive space closely following

with 0.55. The coefficient of variation for professional knowledge and experience was 0.12 while the other two factors' coefficient was 0.13. The means of these predictors further supported the findings of the multicollinearity test, indicating a strong correlation between these variables as their results here are nearly identical. An educator's perception of each of these variables depends more on internal than external factors, such as years of experience, participation in teacher training, and professional development that build a sense of capability in individual teachers. Potentially having more control over these aspects of their profession, teachers responded similarly to the statements pertaining to these variables making their means more reliable. After considering Cronbach's alpha and the mean statistics, this study's newly created survey provided reliable data for analysis and discussion.

Other considerations when examining the means were the indication of positive, neutral, and negative responses. Job satisfaction resulted in the lowest mean of 3.6 indicating only a slightly positive response to these statements. This data point was critical in assessing why the study was conducted. Job satisfaction leads to higher teacher attrition. From the results of this study's survey, secondary science teachers were not reporting elevated levels of job satisfaction. Similarly, these teachers only noted slightly positive views of their administrative support, self-efficacy, and social capital. These means are concerning because administrative support and social capital were two of this study's three most significant individual influences on job satisfaction. If educators were not responding positively to statements regarding job satisfaction or its main factors of influence, this reveals a weakness in the education system that needs to be addressed to keep teachers in the classroom. As complexity theory describes, failure in one part of a system leads to a cascading failure of the interconnected parts (Wernli et al., 2021). When teachers are not provided the necessary adaptive space to handle change or

given support to increase their professional capital, this leads to a natural decline in job

satisfaction. A decrease in teacher job satisfaction becomes a system problem disguised as

low retention and teacher shortages. If we know that administrative support and social and

decisional capital are critical factors in increasing job satisfaction, these factors need to be

regularly and consistently monitored and improved.

The survey also revealed some positive data concerning several of the predictors. The area

in which teachers responded the most positively was professional knowledge and experience,

with a mean of 4.3 followed closely by adaptive space and human capital, with means of 4.1.

These were the same variables with the lowest standard deviation level, further supporting the

idea that there may be fewer external factors of influence on the variables, giving educators

more control of these aspects of their profession. Unfortunately, these predictors encompassed

three of the four least significant influencers of job satisfaction. Although survey participants

responded positively to these variables, they had the least influence on teachers' level of job

satisfaction. Based on the means of the predictor variables and their comparative influence on

job satisfaction, school systems should focus on improving administrative support and teacher

decisional capital to increase job satisfaction more than building an educator's human capital,

which can be improved through individual teacher experiences.

Inferential Findings

Except for the demographic variables, all the predictors produced statistically significant

results at the 0.01 level in a 2-tailed test. As listed in Table 5, Pearson's r values of the

demographic factors ranged from -.088 to .144 showing no correlation between these

variables and job satisfaction. Due to the high ratio of female respondents, the r value of the

sex of the participants (.144) may be skewed or inaccurate. All other demographic fields had

enough variation in responses to assume the results for these variables are accurate. This means that characteristics such as an educator's age and number of years teaching or the different grades and schools they have taught in had no impact on the participants' job satisfaction. These unexpected results generated some additional questions about how changes in school settings could be the cause or effect of a teacher's level of adaptability. There may be an additional link to connect these factors to job satisfaction that was not examined in this study. Although the demographic factors showed no correlation to job satisfaction, they were not analyzed for their influence on a teacher's adaptability. These variables may influence teacher adaptability, which would then influence job satisfaction, but this hypothesis was not investigated in the current study.

This research study aimed to examine the relationship between teacher adaptability and job satisfaction of secondary science teachers by answering the following questions:

1. What are the components of professional capital that influence teacher adaptability?

2. How does teacher adaptability influence secondary science teachers' job satisfaction?

The results of this study demonstrated how individual adaptability factors such as self-efficacy and adaptive space influence job satisfaction, but also how the elements of professional capital collectively influence job satisfaction through the creation of adaptive space.

Research Question One

While the research provided a partial answer to the first question in breaking down the elements of professional capital into human, social, and decisional capital, survey data analysis supported each of these elements and their role as collective adaptability factors that influence job satisfaction. Based on the research literature, several adaptability factors

comprise the elements of professional capital. Human capital develops from teachers'

professional knowledge and experience and self-efficacy, social capital develops from peer

collaboration and administrative support, and decisional capital develops from the

instructional autonomy and collaboration within adaptive space and administrative support.

This study's data revealed that several individual and collective predictors of teacher

adaptability and job satisfaction derive from the elements of professional capital. After

accounting for its collinearity with self-efficacy, human capital had an overall effect size of

.480 on the adaptability factors examined in this study, with the most significant influence

coming from professional knowledge and experience (.807). Social capital had an effect size

of .555, with the most significant influence from administrative support (.896). Decisional

capital's effect size was .587, with strong influences from adaptive space (.848) and

administrative support (.717). These results demonstrate the strong correlations between the

elements of professional capital and adaptability factors.

The influence of social and decisional capital on teacher adaptability is evident from the

strong influence of administrative support and adaptive space, which includes teacher

collaboration and autonomy., Although human capital had a strong correlation with

professional knowledge and experience, this factor had one of the lowest correlations with

teacher adaptability and thus revealed a low level of influence. Human capital also had the

lowest correlations with administrative support and adaptive space, which were significant

factors in teacher adaptability and job satisfaction. Therefore, the data revealed that social and

decisional capital were the strongest influences on adaptability, which answers research

question one about which aspects of professional capital influence teacher adaptability. In

further detail, the adaptive space and administrative support found within these elements of professional capital had the greatest influence on teacher adaptability.

Research Question Two

To answer research question two regarding how teacher adaptability influences secondary science teachers' job satisfaction, this study analyzed individual adaptability factors and collective factors from the elements of professional capital. The strongest correlation between any predictor and job satisfaction came from the decisional capital element of professional capital. With an *r* value of .839, this variable was the most significant influencer of job satisfaction. This means that by the educational system promoting decisional capital, teachers can develop a greater sense of job satisfaction than they would from any other variable tested in this study. Decisional capital includes making choices about classroom routines and procedures, creating assessments, modifying instruction, having control over teaching resources and professional development, and for science teachers, making decisions about lab investigations and materials. As these behaviors involve change, they require a teacher to have skills in adaptability and be provided a supportive adaptive space to practice those skills. Promoting a positive adaptive space provides a certain level of instructional autonomy in which teachers can make decisions based on their knowledge and experience. Unfortunately, since the implementation of No Child Left Behind, Race to the Top, and Common Core State Standards, teachers have reported reduced instructional autonomy (Glazer, 2018; Parsons et al., 2018).

These policy changes in accountability have limited, and possibly reduced, teachers' decisional capital, thus negatively impacting their job satisfaction. This study's findings supported other research on teacher autonomy's impact on teacher retention due to job-related

stress and job satisfaction (Behr, 2021; Worth & Van den Brande, 2020). If teachers experience reduced decisional capital from a lack of instructional autonomy, their job satisfaction decreases, resulting in higher teacher attrition and less commitment to the profession (Behr, 2021). Autonomy is a crucial component of innovation and creativity, allowing teachers to be more adaptable, thus having the skills to handle the many changes in their profession (Griffin & Hesketh, 2003). Forty percent of teachers with low autonomy report low job satisfaction as opposed to less than one percent of teachers with high levels of autonomy (Worth & Van den Brande, 2020). Autonomy allows teachers to collaborate and be acknowledged for their professional judgment rather than having limited input, which may result in job dissatisfaction and teacher attrition (Glazer, 2018; Quartz et al., 2008).

Instructional autonomy is a critical component of decisional capital and is often controlled by the school administration. Thus, administrative support becomes essential to decisional capital and job satisfaction. The results of this study revealed administrative support as the adaptability factor with the most significant correlation with job satisfaction with a coefficient of .744. Many facets of a teacher's daily experience and the creation of their adaptive space come from the type and level of administrative support that teachers are provided. Whether the issues concern instruction, student behaviors, professional development, or policy changes, teachers' adaptive space and ability to deal with professional pressures can be supported, neglected, or hindered by the school administration (Collie & Martin, 2017; Munda, 2021). Given the high correlation of administrative support with job satisfaction, this area should be regularly monitored and adjusted to maintain a positive adaptive space for teachers.

Although decisional capital showed the highest correlation with job satisfaction, social capital had the second highest coefficient of .815. Social capital is comprised of peer collaboration and administrative support within a school. Administrative support's role in social capital is to provide time, facilities, and resources for teacher collaboration (Hargreaves & Fullan, 2013). Along with autonomy, collaboration is also a component of adaptive space which had a strong correlation (r value of .688) with job satisfaction. Teachers have reported that collaboration is one of the most important aspects of their working environment (Allen & Sims, 2017). Collaboration allows teachers to share ideas, problem-solve, and express their creativity. Complexity theory strongly supports this type of interaction. As a part of an interwoven complex system, teachers need collaboration and autonomy to adapt to change so that the school can continue to evolve and survive (Morrison, 2006). With administrative support, teachers can create strong networks and self-organization, thus meeting the demands of internal and external changes within the educational system and their individual schools. Administrative support is a facet of both decisional and social capital; thus, through collaboration and autonomy, this facet is a very significant predictor of job satisfaction (.744).

Conversely, the two adaptability predictors that indicated low to moderate levels of individual correlation with job satisfaction were self-efficacy and professional knowledge and experience. The coefficient for self-efficacy was .502 indicating a moderate correlation, while professional knowledge and experience resulted in the lowest correlation of all variables with a coefficient of only .305. These results showed that while teachers may feel competent in their content and confident in their instruction, these beliefs do not necessarily translate into positive job satisfaction. Having vast knowledge and experience can facilitate a teacher's ability to provide quality instruction and perhaps result in positive student academic

performance; however, these factors are not translating into increased job satisfaction. On the other hand, the data suggest that teachers' confidence and belief in their abilities, rather than their abilities themselves, had a greater correlation with job satisfaction. Hence, creating a positive adaptive space where teachers feel good about their instruction and what they do in the classroom can be even more important in improving their job satisfaction than the knowledge and skills they gain from professional development.

The lowest level of correlation found in the professional capital elements was human capital, which fell in between self-efficacy and professional knowledge and experience with a coefficient of .451. These three predictors are very similar; all three have high levels of inter-item collinearity. Thus, it is not surprising that their correlations with job satisfaction were comparable. Human capital is comprised of a teacher's knowledge, skills, and experience which can impact their self-efficacy (Solly, 2018). Having a low to moderate correlation with job satisfaction indicated that, much like the adaptability factors with similar correlation, human capital was not as essential to job satisfaction as having social or decisional capital.

Inter-item Correlation

This study aimed to reveal the components of professional capital that influenced teacher adaptability and how that adaptability influenced job satisfaction. Even after accounting for collinearity, some predictors demonstrated strong correlations with each other. Three different relationships resulted in p values greater than .700 indicating very strong correlations. Decisional capital and administrative support had a correlation of .717, decisional capital and adaptive space had a correlation coefficient of .848, and social capital and administrative support had the highest coefficient of all predictor pairs at .896. The inter-item correlation results indicated that social and decisional capital strongly influenced

adaptability through their relationships with adaptive space and administrative support. These four predictors also had the strongest correlations with job satisfaction, indicating their potential importance to the research questions.

Adaptability is necessary for teachers to provide differentiated instruction appropriate for their students' needs and is the cornerstone of an effective teacher (Parsons et al., 2016). This adaptability requires decision-making skills and instructional autonomy that can be provided through a positive adaptive space and administrative support. The strong correlation between decisional and social capital and job satisfaction illustrates the need for teachers to have this adaptive space and administrative support to also have job satisfaction. To better understand the pathway from the predictors to adaptability to job satisfaction, consider the elements that comprise each variable and their individual and collective correlations as illustrated in Figure 2.

Figure 2

Conceptual Framework of Professional Capital and Adaptability According to Their Degree of

Influence on Job Satisfaction
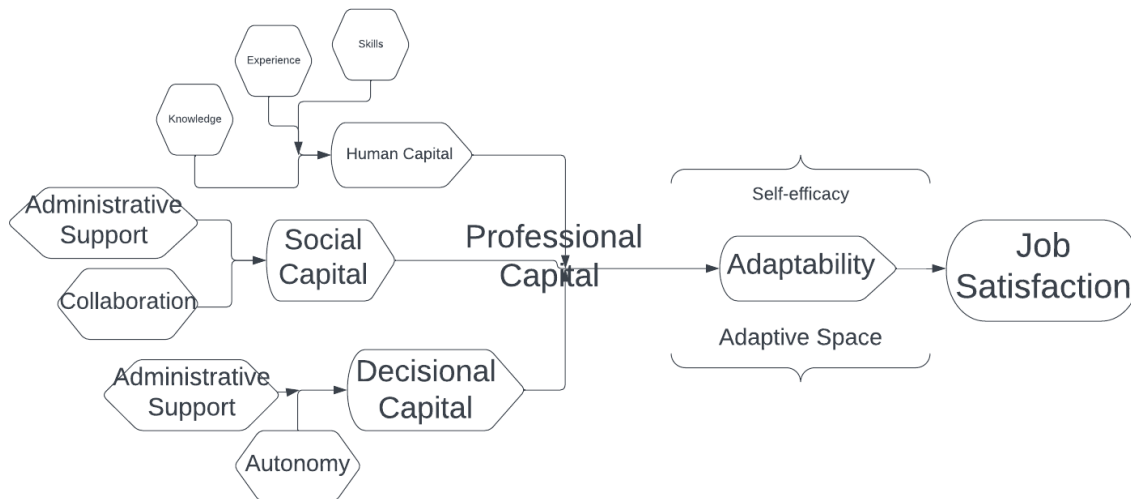
Note: This diagram illustrates the degree to which each predictor variable influences job satisfaction. Relative font size is based on the order of significance from Table 10.

For example, with a job satisfaction correlation of .688, adaptive space is comprised of collaboration and instructional autonomy. When the collaboration data were combined with administrative support, whose correlation is .744, the result was social capital with a correlation of .815. The combination of collaboration and administrative support highly predicted secondary science teachers' job satisfaction. Similarly, with a correlation of .839, decisional capital is comprised of instructional autonomy and administrative support. Therefore, the decisional capital that resulted from the combination of administrative support and instructional autonomy was a predictor of job satisfaction. Social and decisional capital also had an inter-item correlation of .614 indicating a strong relationship. As the most significant individual influencer of job satisfaction, administrative support, as it relates to

collaboration and autonomy, was a key component to building a teacher's professional capital, adaptive space, and job satisfaction. Collectively, social and decisional capital held the most substantial influence on teacher adaptability and job satisfaction.

Other predictor correlations of note included the relationships between professional knowledge and experience with the other variables. While administrative support had the highest mean for inter-item correlations (.543), professional knowledge and experience had the lowest (.421). When the data were adjusted for collinearity, the mean correlation for professional knowledge and experience fell to .344 indicating a weak correlation with the other adaptability factors. These results challenged a previous study that claimed teachers with high levels of professional knowledge have a greater capacity for decision-making and that their experience makes them more adaptable (Parsons et al., 2016). According to the results of this study, a teacher's knowledge and experience had the least influence on their adaptability and only a weak influence on their decisional capital. However, in the same study, Parsons et al. (2016) did note that teachers also needed collaboration and support to build their adaptive space and adaptability, which is reinforced by the results of this study.

Another claim challenged by this study's data is that teachers with more experience have lower adaptability (Collie et al., 2020). The study conducted by Collie et al. (2020) claimed that as teachers became older and more experienced, they became less adaptable to change. According to the results of this study, age and years of experience had no significant correlation to any of the adaptability factors tested. All correlation coefficients for the descriptive characteristics were between -.200 and .250 indicating no relationship between these variables and the adaptability predictors of this study. Although one might hypothesize

that age and experience might give teachers more adaptive skills, according to the data, these variables neither hinder, nor benefit, teacher adaptability.

Finally, several studies claim that elevated levels of self-efficacy are linked to greater degrees of job satisfaction (Aldridge & Fraser, 2016; Bandura, 1997; Gkolia et al., 2014). The results of this study's survey question these studies in that data showed only a moderate correlation (.502) between self-efficacy and job satisfaction. However, the other predictor variables can influence and be influenced by self-efficacy, as seen in the multicollinearity analysis. Since self-efficacy is challenging to study independently of other variables' influence, isolating its impact on adaptability and job satisfaction would require a more complex and lengthy study than the one conducted here.

Open-Response Triangulation

For each section of the survey, participants were asked to provide an open response to a question related to the variable in that section. Responses were tallied based on connections participants made between the different adaptability factors and elements of professional capital. Four of these questions were combined in a category identified as adaptive space and their totals were analyzed collectively. These results are detailed in Table 9. In total, 52% of the responses connected to decisional capital and 71% connected job satisfaction and decisional capital. These responses suggested that teachers felt their decision-making skills and autonomy were essential to other aspects of their job, particularly job satisfaction. Decisional capital was also mentioned in 62% of the responses about adaptive space, indicating that teachers related their decision-making and autonomy to their adaptive space. Decisional capital also includes administrative support, and based on the data we can hypothesize that teachers felt this support was necessary for their adaptability and job

satisfaction. The analysis of these comments further supported the Likert-scale responses from the survey. Decisional capital, adaptive space, and administrative support were three of the most influential factors for job satisfaction and the frequencies of the teacher comments provided further validation for this data.

Other results showed that although adaptive space was connected to social and decisional capital by 58% and 62% of the responses, respectively, only 27% of the respondents made connections between adaptive space and human capital. According to their responses, teachers associated the collaboration and autonomy of adaptive space with developing their social and decisional capital. As these elements of professional capital strongly correlate with job satisfaction, the teachers' comments reinforced the relationship between adaptive space and job satisfaction as indicated by the Likert results. The data further supported the correlation results demonstrating a minimal relationship between human capital and adaptive space. The responses suggested that teachers do not view their knowledge and experience as significant factors in their adaptability.

Interestingly, the responses relating human capital to other adaptability factors were inconsistent with what their Pearson correlations would indicate. Human capital was connected to administrative support in 45% of the responses while self-efficacy was mentioned in 47%. Human capital and self-efficacy had a high degree of collinearity, so having only 47% of the survey participants connect these predictors in their responses was surprising. If teachers were not making connections between self-efficacy and human capital, then it could be hypothesized that they do not view their knowledge and experience as being critical factors in how they see themselves as teachers. Conversely, nearly half of the respondents made connections between human capital and administrative support which only

showed a weak correlation of .346 in the Pearson analysis. Since some of the survey questions specifically asked about professional development and teacher training, these data could suggest that teachers directly associated the support of their administration with coordinating or providing these resources. The open responses only somewhat support the relationship between human capital and administrative support indicated in the Likert data.

While social and decisional capital had the strongest correlations with job satisfaction in the Pearson analysis, the same results were not implied in the open responses. While 71% of the participants connected decisional capital to job satisfaction, only 32% connected social capital with the outcome variable. This discrepancy could result from the participants' interpretation of the questions. Another hypothesis could be that since there was an overwhelming response related to decisional capital, this predictor was viewed as the most critical to the participants; therefore, that variable was most focused on when answering the question about job satisfaction.

Likewise, comparing the cumulative connections of the open responses and the Likert data came with mixed results. When examined collectively, the questions related to adaptive space resulted in participants connecting 42% of the responses to human capital, 25% to social capital, and 48% to decisional capital. These ratios did not match the correlations previously seen in the Pearson analysis. Human capital had a much lower p value of .451 compared to the very strong p values of .815 and .839 of social and decisional capital, respectively. Combined with the many responses connecting administrative support and human capital, these data could again result from teachers associating professional development and teacher workshops with the administration's responsibilities rather than with their knowledge and experience. Similarly, a prior study also discussed how school leaders

directly influence human capital by determining how teachers can utilize their knowledge (Voigt, 2021). In this capacity, a lack of administrative support, trust, or recognition of teacher abilities can impact decisional and human capital, which may play out in this study's results.

Interestingly, while nearly half of the open responses connected to human capital, the least mentioned variables in these comments were adaptive space and job satisfaction. The Pearson analysis shows that these data further supported the minimal correlation between human capital and these variables. Although teachers voiced concerns about their human capital and its connection to administrative support, the focus of their comments remained on adaptive space and decisional capital as the strongest connections to job satisfaction. Whether we look at the results of the correlation and regression from the Likert data or the ratio of comments connecting the different predictors in the open responses, both sets of data suggested that human and social capital, along with administrative support, had the most significant influence on teacher adaptability and the resulting job satisfaction.

Limitations

As with most research, this study presented limitations that warrant consideration when analyzing the data. One limitation to consider in this study was the actual sample. Although the N value of 102 was adequate for multiple regression analysis, a larger sample would have provided results more easily generalized to other teacher groups. In addition, most of the participants were female, which could result in data bias. Using online forums to collect data might have influenced the ratio of male to female participants, and with a larger sample, the results may have been more balanced. Additional studies should obtain responses more equally from both sexes to provide data with potentially less bias.

Another limitation of this study was the number of items included in the survey. Although many factors influence adaptability and job satisfaction, the survey questions limited the range of these variables to collaboration, autonomy, self-efficacy, and adaptive space. This study did not include factors such as pay, school climate or size, or union-nonunion status to focus on the adaptability factors that specifically fit under professional capital. Limiting the variables likely resulted in more survey responses, as too many questions often deter participants. Consequently, there were fewer responses to the open-ended questions toward the end of the survey than at the beginning. This reduction in participation could have resulted from survey fatigue as participants continued answering questions.

The most significant limitation to consider for this study was the numerous covariates and confounders that influence the predictor and outcome variables in this study. While the survey was constructed to address this issue as much as possible, it is nearly impossible to isolate individual variables or prevent collinearity when research involves human perspective and social sciences. The potential bias that can result from these issues is the main reason multiple analyses were conducted to verify the reliability of this study's results and to triangulate the data with open responses. Not including more variables reduced the chance of collinearity between predictors but could also disguise or shadow correlations between variables. By including only those factors that comprise professional capital, this study was able to home in on critical factors influencing adaptability and the resulting job satisfaction.

Implications

Educators encounter constant changes in which they must find ways to adapt and evolve their instruction and professional behaviors (Collie et al., 2020). New students, updated content standards, and policy changes are just a few challenges teachers face daily.

Prior research has established that adaptability makes teachers more functional and improves

student achievement (Collie et al., 2020). Thus, having adaptability could impact a teacher's

job satisfaction. With teacher job satisfaction at its lowest recorded level and teacher

shortages at a critical point, the education system must implement every reasonable strategy

to keep teachers satisfied and in the classroom. One group that is particularly vulnerable to

this issue is secondary science teachers. As these educators leave the profession in large

numbers and early in their careers, filling their vacancies is becoming increasingly

challenging (Park & Johnson, 2019). Providing a supportive environment for teacher

adaptability can improve job satisfaction and keep more educators in the profession (Behr,

2021).

Many studies have examined the factors influencing job satisfaction, from salary to

class size. However, limited research has been conducted on teacher adaptability, particularly

through the lens of professional capital. This study analyzed the results of a teacher survey

that broke down the elements of professional capital to determine how they affected teacher

adaptability and the resulting job satisfaction. Analyses revealed that administrative support

and social and decisional capital all had strong positive correlations with creating teachers'

adaptive space. Social capital is built from administrator-supported collaboration and

decisional capital is built from administrator-supported autonomy (Behr, 2021; Hargreaves &

Fullan, 2013; Solly, 2018). Results also indicated that social and decisional capital had

significant positive correlations with and were strong predictors of job satisfaction. These

capital elements strongly correlated with administrative support, predicting job satisfaction.

To reduce the attrition of secondary science teachers, one implication of this study is

that to increase job satisfaction, the education system must improve adaptability through

developing professional capital. Developing teachers' social and decisional capital is the most critical issue to be addressed. If these factors support a teacher's adaptive space and job satisfaction, the education system should put time and money into improving these facets of professional capital. Collaboration, autonomy, and administrative support strengthen teachers' social and decisional capital. For this reason, these areas should be considered and addressed within our schools. Other studies have shown that schools with high trust collaboration and administrator-supported autonomy had fewer disruptions to student learning, higher levels of teacher adaptability, and greater teacher confidence (Collie et al., 2020; Voigt, 2021). Hence, building social and decisional capital positively influences many aspects of a school and should be regularly and consistently monitored for improvement.

Not all professional capital elements appear equally critical for teacher adaptability and job satisfaction. According to the results of this study, human capital, comprised of professional knowledge, skills, and experience, had the weakest correlation with adaptive space and job satisfaction. This is not to say that teacher education is not important; it is. However, if most teacher training is focused on professional education rather than building social and decisional capital, our time and money could be better spent. If we want teachers to be more satisfied in their role as educators and to remain in the profession, we must shift our focus. Often, teacher workshops focus on instructional strategies and professional knowledge. Therefore, based on this study's results, the second implication is that professional development and teacher training should support different collaboration models and provide guidance on decision-making and differentiation for improved teacher autonomy.

Another implication of these results is that administrative staff should support collaboration by providing time, resources, and facilities for teachers to meet and plan

together. Unlike human or decisional capital, social capital can decrease if not used (Baker-Doyle, 2015). If teachers cannot collaborate, relations with their colleagues and the school's collective efficacy can negatively impact job satisfaction. Administrators must also be willing to allow teachers to try new strategies, learn from failures, explore new resources, and practice instructional autonomy. The collaboration and autonomy given to teachers strengthen their professional capital and improve their adaptability and job satisfaction. Studies have shown that when teachers are satisfied with their job, they are more engaged and committed to the profession (Collie et al., 2018). Thus, if we hire administrators who will encourage and support collaboration and autonomy, teachers may stay in the profession longer.

Another implication associated with the connection to teacher retention is that the development of professional capital is critical to job satisfaction. One of the main reasons this study was conducted was to help find solutions to the ongoing teacher shortage. This study revealed a strong correlation between elements of professional capital and job satisfaction. Accordingly, if the school system hopes to retain more teachers, it should focus on improving job satisfaction through professional capital development. This is especially true for secondary science teachers with some of the lowest retention rates of all grades and subject areas (Wan et al., 2021). These teachers can often find employment outside of education more easily than most of their peers, especially with the recent increase in STEM careers. Thus, the education system needs to make improving the job satisfaction of secondary science teachers a priority for the future.

Some final considerations for implications from this study center around the difficulty in isolating variables to reveal their influence on adaptability and job satisfaction. Since many of the predictors in this study were affected by multiple internal and external factors that

cannot all be accounted for in a single study, it was difficult to determine the independent

effects of any one variable. As the multicollinearity analysis revealed, human capital,

professional knowledge and experience, and self-efficacy all had strong correlations

indicating their data may skew the overall results. As a social science, education research

studies can be less exact than more mathematical fields. There are human aspects like

personality and individual experiences to account for that can create bias in studies such as

this. The close relationship between several of the predictors in this study indicates the

difficulty in determining any single cause-and-effect relationship between two individual

variables. This means studies examining adaptability or job satisfaction must consider the

numerous covariates and confounders when analyzing their results.

Based on the results of this study, collaboration, autonomy, and administrative support

are critical factors in providing teachers with adaptive space and supporting their adaptive

skills. This information suggests new ways to address the teacher shortage in the United

States. If given administrative support, opportunities for collaboration, and the freedom to be

autonomous with their instruction, this study's results denote that teachers can increase their

adaptability and improve their job satisfaction. Many previous studies focused on how teacher

adaptability in the classroom affected student performance, whereas this study drew

correlations between adaptability and job satisfaction. By shifting the focus of the research to

address a current education issue, the results of this study can benefit teachers, administrators,

and their schools by improving teacher job satisfaction and reducing the number of educators

leaving the classroom. Studies have shown that career adaptability indicates teacher

resilience, prepares educators to cope with changes in working conditions, and is necessary

for teacher retention (Mason & Matas, 2015; McIlveen et al., 2018; Rottinghaus et al., 2005;

Savickas, 1997). Other studies have shown that having adaptive skills makes teachers less likely to experience burnout and more likely to remain in the profession (Cinamon et al., 2007; Day et al., 2006; McIlveen et al., 2018). Therefore, not only will improving teacher adaptability increase their job satisfaction, but it will also improve the teacher shortage by increasing retention.

Given the many studies that have explored job satisfaction, only a few have analyzed adaptability, particularly in relation to professional capital. There is much more to discover about the adaptive space teachers need and how it can increase their job satisfaction. While the results of this study may help answer some basic questions on these topics and provide a few possible solutions for improving them, plenty of research is still needed. Although these results have chiseled out the basic path from professional capital to adaptability to job satisfaction, there are many variables and potential correlations that this study could not accommodate. Using what we have learned about the importance of social and decisional capital in the development of teachers' adaptive space and its influence on job satisfaction, there are several recommendations we can make for extended and future studies.

Recommendations

Job satisfaction is critical to keeping teachers in the classroom. Based on this study's results, we should focus on specific influencers such as administrative support, collaboration, and instructional autonomy. Additionally, countless variables influence teacher job satisfaction requiring many more studies to tease out the perfect combination of supports teachers need to stay satisfied in their profession. Based on this study's results, one recommendation would be to reevaluate current policies and practices that limit or hinder teacher autonomy. Decisional capital was the strongest predictor of job satisfaction and

adaptive space in this study. If constant changes are confronting teachers, they should be given the support and freedom to make on-the-spot decisions that will impact their classroom and students.

Therefore, current policies that dictate standardized curricula and assessments should be reevaluated. While providing all students with an equitable education and exposing them to the same content is essential, there must be some accommodation and differentiation for teachers. Not all teachers, nor all students, are the same. Removing instructional autonomy by mandating that all educators teach the same things the same way lessens teachers' ability to meet the needs of their students and reduces their decisional capital and job satisfaction. These changes cannot just happen on a national level but also within local districts and individual schools. Therefore, teachers should also have administrative support in making autonomous decisions regarding their instruction. Consequently, teacher autonomy should be one of the main concerns in making teachers happy in their profession.

Another recommendation to consider for professional practices is to reassess the collaboration structures within our school systems. Providing adequate resources, time, space, and administrative support for collaboration is essential to teacher adaptability, social capital, and job satisfaction. Changes in education rarely impact only individuals; thus, teachers may experience collective adaptation that regular collaboration opportunities would support. This adaptation occurred during the pandemic when mass changes were required of entire schools, grade levels, and content areas. As illustrated by complex systems, educators nationwide had to propose and implement solutions and co-evolve to maintain a functioning educational environment. Although changes are not always this drastic, the education system can better

prepare for minor and major changes if teachers are provided with administrator-supported collaboration.

Just as teachers regularly attend professional development, another recommendation from this study relates to administrator training. If teachers are given the freedom of instructional autonomy and opportunities for collaboration, administrators must understand their importance and how to implement and maintain them in their schools effectively. Sharing data from this and other similar studies can emphasize and reinforce the importance of these professional aspects in keeping teachers satisfied and in the classroom. Regular sessions should be provided to administrators to assess their teachers' freedom and opportunities for autonomy and collaboration and evaluate ways to improve these leadership skills. These circumstances cannot be initiated at the beginning of a school year and are expected to continue successfully without some monitoring and maintenance.

In addition to recommendations for professional practices, there are some suggestions for extended and future research. Although some qualitative data were collected in the open responses to the survey, this data was converted into frequencies to maintain a quantitative research study. These responses should be further analyzed for patterns and correlations to different adaptability factors and other variables impacting job satisfaction. Future studies can also expand upon the quantitative analyses conducted in this survey to address some of the collinearity concerns or more closely examine the discrepancies in the Likert data versus the open responses. Analyzing the qualitative data can provide additional insight into how teachers feel about adaptability and its effect on job satisfaction. This analysis could be further supported by conducting interviews using the survey questions and gathering additional qualitative data with more in-depth responses.

Future studies should also be conducted in other teacher groups. This research focused on secondary science teachers because of their critical shortage level. However, the small and narrow sample may make generalizing the results to other grade levels or content areas difficult. Therefore, further studies should survey teacher groups of different subjects, grade levels, age, experience, private versus public schools, union status, or regular versus special education. What positively affects adaptability and job satisfaction in secondary science teachers may have different results for a kindergarten, social studies, or first-year teacher. Since low teacher retention affects nearly all educators, finding out the needs of each group is essential to keep them in the profession.

Finally, additional studies should be conducted to isolate what administrative support looks like in relation to providing autonomy and collaboration. Since the data suggested such strong correlations between these three variables and their relationships with adaptability and job satisfaction, understanding how they interact with and influence each other appears to be extremely important for future teacher retention. This analysis would require numerous related studies identifying the specific types of adaptive skills, elements of autonomy, roles of administrative support, and characteristics of collaboration. These factors could be examined in individual studies and analyzed collectively to determine patterns and additional correlations between variables. Numerous internal and external influences make adaptability and job satisfaction challenging to determine and predict from any single study. Hence, the need for multiple studies evaluating the various factors is necessary. While collecting and analyzing all the data may take several years, completing the studies will be worth the time and effort necessary if it improves the teacher retention crisis.

Conclusion

Discussions of how to retain teachers are a part of everyday conversations in the world of education. Secondary science teacher attrition is of particular concern due to the growing number of these educators leaving the classroom. At a time when STEM jobs are becoming even more critical, retaining science teachers should be a high priority for the education system. With the United States experiencing the lowest level of teacher job satisfaction ever recorded, we must determine the cause of this dissatisfaction and urgently find ways to improve it. Although prior studies have addressed numerous factors impacting job satisfaction, more research is needed to examine teacher adaptability. As educators are exposed to nearly constant change, adaptive skills are vital to a teacher's ability to evolve within the education system. This study aimed to determine how professional capital and teacher adaptability influenced secondary science teacher job satisfaction in hopes of revealing possible ways to address the ongoing teacher shortage.

After surveying more than one hundred teachers across the country, the results of this study identified several important relationships between adaptability factors and predictors of job satisfaction. Data revealed that previously studied factors such as human capital and self-efficacy had little impact on teacher adaptability or job satisfaction. However, social and decisional capital had significant positive correlations with and were strong predictors of adaptability and job satisfaction. These relationships spark potential ideas for reducing and minimizing teacher attrition such as providing administrative support, creating opportunities for teacher collaboration, and allowing freedom of instructional autonomy. Building teachers' social and decisional capital supports a positive adaptive space where teachers grow professional capital and improve their adaptability and job satisfaction. With some minor, but

consequential, modifications to our professional practices, our school systems can keep more

educators in the classroom, especially our secondary science teachers.

References

Aldridge, J. M., & Fraser, B. J. (2016). Teachers' views of their school climate and its relationship with teacher self-efficacy and job satisfaction. *Learning Environments Research*, *19*(2), 291–307. https://doi.org/10.1007/s10984-015-9198-x.

Allen, R., & Sims, S. (2017). (rep.). *Improving science teacher retention: Do National STEM Learning Network professional development courses keep science teachers in the classroom?* London, England: FFT Education Datalab.

Andres, L. M., Cruz, J. B., Gonzaga, M. P., Rodriguez, I. S., Sanchez, J. A., & Ortiz, A. F. (2021). Teachers' level of adaptability and performance: Their response to the rapidly transforming academic world. *International Journal of English Literature and Social Sciences*, *6*(3), 326–331. https://doi.org/10.22161/ijels.63.46.

Arena, M. J. (2018). *Adaptive Space*. McGraw-Hill Education.

Arena, M. J. (2022, January 19). *Adaptive space: Shifting from structural to social design*. Management and Business Review. Retrieved September 25, 2022, from https://mbrjournal.com/2021/01/26/adaptive-space-shifting-from-structural-to-social-design/.

Baker-Doyle, K. J. (2015). No teacher is an island: How social networks shape teacher quality. *Promoting and Sustaining a Quality Teacher Workforce*, 367–383. https://doi.org/10.1108/s1479-367920140000027005.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajaras & T. Urdan (Eds.), Self-efficacy beliefs for adolescents (pp. 307–337). Greenwich, CT: Information Age Publishers.

Behr, H. (2021). *Beyond the closed door: Teacher autonomy in context* (dissertation).

Bozeman, T. D., Scogin, S., & Stuessy, C. L. (2013). Job satisfaction of high school science

teachers: Prevalence and association with teacher retention. *Electronic Journal of Science

Education*, *14*(4). Retrieved October 9, 2022, from http://ejse.southwestern.edu.

Cambridge University Press. (2022). *Job satisfaction*. Cambridge English Dictionary. Retrieved

September 11, 2022, from https://dictionary.cambridge.org/us/dictionary/english/job-

satisfaction.

Casler, K., Bickel, L., & Hackett, E. (2013). Separate but equal? A comparison of participants

and data gathered via Amazon's Mturk, social media, and face-to-face behavioral testing.

Computers in Human Behavior, *29*(6), 2156–2160.

https://doi.org/10.1016/j.chb.2013.05.009.

Chapman, L. A., & Elbaum, B. (2021). How—and Why—Middle School intensive reading

teachers make adaptations to a scripted curriculum. *Teacher Education and Special

Education: The Journal of the Teacher Education Division of the Council for Exceptional

Children*, *44*(4), 281–299. https://doi.org/10.1177/0888406421992377.

Cinamon, R. G., Rich, Y., & Westman, M. (2007). Teachers' occupation-specific work-family

conflict. *The Career Development Quarterly*, *55*(3), 249–261.

https://doi.org/10.1002/j.2161-0045.2007.tb00081.x

Collie, R. J., Granziera, H., & Martin, A. J. (2018). Teachers' perceived autonomy support and

adaptability: An investigation employing the job demands-resources model as relevant to

workplace exhaustion, disengagement, and commitment. *Teaching and Teacher Education*,

74, 125–136. https://doi.org/10.1016/j.tate.2018.04.015.

Collie, R. J., Granziera, H., Martin, A. J., Burns, E. C., & Holliman, A. J. (2020). Adaptability

among science teachers in schools: A multi-nation examination of its role in school

outcomes. *Teaching and Teacher Education*, *95*, 103148.

https://doi.org/10.1016/j.tate.2020.103148

Collie, R. J., & Martin, A. J. (2017). Teachers' sense of adaptability: Examining links with

perceived autonomy support, teachers' psychological functioning, and students' numeracy

achievement. *Learning and Individual Differences*, *55*, 29–39.

https://doi.org/10.1016/j.lindif.2017.03.003.

Day, C., Stobart, G., Sammons, P., Kington, A., Gu, Q., Smees, R., & Mujtaba, T. (2006).

Variations in teachers' work, lives and effectiveness. *PsycEXTRA Dataset*.

https://doi.org/10.1037/e615332007-001

Demir, E. K. (2021). The role of social capital for teacher professional learning and student

achievement: A systematic literature review. *Educational Research Review*, *33*, 100391.

https://doi.org/10.1016/j.edurev.2021.100391.

Deogratias, E. (2018). *International Journal of Curriculum and Instruction*, *10*(2), 142–151.

Doney, P. A. (2013). Fostering resilience: A necessary skill for teacher retention. *Journal of

Science Teacher Education*, *24*(4), 645–664. https://doi.org/10.1007/s10972-012-9324-x.

Eryilmaz, A., & Kara, A. (2017). Comparison of teachers and pre-service teachers with respect

to personality traits and career adaptability. *International Journal of Instruction*, *10*(01),

85–100. https://doi.org/10.12973/iji.2017.1016a.

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics*. Sage Publications.

Floden, R. E., Porter, A. C., Alford, L. E., Freeman, D. J., Irwin, S., Schmidt, W. H., & Schwille,

J. R. (1988). Instructional leadership at the district level: A closer look at autonomy and

control. *Educational Administration Quarterly*, *24*(2), 96–124.

https://doi.org/10.1177/0013161x88024002003.

Forcino, F. L., Leighton, L. R., Twerdy, P., & Cahill, J. F. (2015). Reexamining sample size

    requirements for multivariate, abundance-based community research: When resources are

    limited, the research does not have to be. *PLOS ONE*, *10*(6).

    https://doi.org/10.1371/journal.pone.0128379

Friedman, I. A. (2012). Teacher Work-Autonomy Scale. PsycTESTS Dataset.

    https://doi.org/10.1037/t07555-000.

Fullan, M. (2016). Amplify change with professional capital. *The Learning Professional*, *37*(1),

    44–56.

Garcia, E., & Weiss, E. (2019). *U.S. schools struggle to hire and retain teachers* (The Perfect

    Storm in the Teacher Labor Market series, 2nd report). Economic Policy Institute.

    Retrieved from https://www.epi.org/publication/u-s-schools-struggle-to-hire-and-retain-

    teachers-the-second- report-in-the-perfect-storm-in-the-teacher-labor-market-series/.

Gilead, T., & Dishon, G. (2021). Rethinking future uncertainty in the shadow of COVID 19:

    Education, change, complexity and adaptability. *Educational Philosophy and Theory*,

    54(6), 822–833. https://doi.org/10.1080/00131857.2021.1920395.

Gkolia, A., Belias, D., & Koustelios, A. (2014). Teacher's job satisfaction and self-efficacy: a

    review. *European Scientific Journal*, *10*(22), 321-342.

Glazer, J. (2018). Learning from those who no longer teach: Viewing teacher attrition through a

    resistance lens. *Teaching and Teacher Education*, *74*, 62–71.

    https://doi.org/10.1016/j.tate.2018.04.011.

Goddard, R. D., & Salloum, S. J. (2011). Collective efficacy beliefs, organizational excellence,

    and leadership. Oxford Handbooks Online.

    https://doi.org/10.1093/oxfordhb/9780199734610.013.0048.

Griffin, B., & Hesketh, B. (2003). Adaptable behaviours for successful work and career adjustment. *Australian Journal of Psychology*, *55*(2), 65–73. https://doi.org/10.1080/00049530412331312914.

Gwaltney, K. D. (2012). *Teacher autonomy in the United States: Establishing a standard definition, validation of a nationally representative construct and an investigation of policy affected teacher groups* (dissertation).

Hampden-Thompson, G., Herring, W. L., & Kienzl, G. (2008). (issue brief). *Attrition of Public School Mathematics and Science Teachers*. National Center for Educational Statistics. Retrieved October 9, 2022, from https://nces.ed.gov/pubSearch/pubsinfo.asp?pubid=2008077.

Hargreaves, A. (2019). Teacher collaboration: 30 Years of research on its nature, forms, limitations and effects. *Teachers and Teaching*, *25*(5), 603–621. https://doi.org/10.1080/13540602.2019.1639499.

Hargreaves, A., & Fullan, M. (2013). With the power of professional capital. *The Learning Professional*, *34*(3), 36–39.

Hill, J., & Stearns, C. (2015). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Selected Subjects: Evidence From the 2011–12 Schools and Staffing Survey* (NCES 2015-814). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Hobbs, L. (2013). Teaching 'out-of-field' as a boundary-crossing event: Factors shaping teacher identity. *International Journal of Science and Mathematics Education*, *11*(2), 271–297. https://doi.org/10.1007/s10763-012-9333-4.

Hughes, G. D. (2012). Teacher retention: teacher characteristics, school characteristics,

   organization characteristics, and teacher efficacy. *The Journal of Education Research*,

   105(4), 245-255. https://doi.org/10.1080/00220671.2011.584922.

Imam, S., Novandari, W., & Wulandari, S. Z. (2020). Prosiding Seminar Internasional (SCA 10).

   In *Advantages of International Sustainable Competitiveness* (1st ed., Vol. 10, pp. 283–

   294). Java, Indonesia.

Iqbal, S., Ehsan, S., Rizwan, M., & Noreen, M. (2014). The impact of organizational

   commitment, job satisfaction, job stress and leadership support on turnover intention in

   educational institutes. *International Journal of Human Resource Studies*, *4*(2), 181–195.

   https://doi.org/10.5296/ijhrs.v4i2.5906.

Jones, T. B. (2013). "Complexity Theory." *The Handbook of Educational Theories*. (B. Irby, B.

   Brown, R. Lara- Alecio, & S. Jackson, Eds). Information Age Pub. 2013. pp. 815-819.

Keith, T. Z. (2019). *Multiple regression and beyond: An introduction to multiple regression and*

   structural equation modeling (Third). Routledge.

Kim, D., Twombly, S., & Wolf-Wendel, L. (2008). Factors predicting community college faculty

   satisfaction with instructional autonomy. *Community College Review*, *35*(3), 159–180.

   https://doi.org/10.1177/0091552107310111.

Kim, K. R., & Seo, E. H. (2018). The relationship between teacher efficacy and students'

   academic achievement: A meta-analysis. *Social Behavior and Personality: An*

   International Journal, *46*(4), 529–540. https://doi.org/10.2224/sbp.6554.

King, D. B., O'Rourke, N., & DeLongis, A. (2014). Social media recruitment and online data

   collection: A beginner's guide and best practices for accessing low-prevalence and hard-to-

reach populations. *Canadian Psychology/Psychologie Canadienne*, *55*(4), 240–249. https://doi.org/10.1037/a0038087.

Krug, D., & Arntzen, J. (2010). Ecologies of learning: Efficacious learning and ICT pedagogical and technological adaptability. *Cases on Interactive Technology Environments and Transnational Collaboration*, 74–93. https://doi.org/10.4018/978-1-61520-909-5.ch004.

Liu, S., Keeley, J. W., Sui, Y., & Sang, L. (2021). Impact of distributed leadership on teacher job satisfaction in China: The mediating roles of teacher autonomy and teacher collaboration. *Studies in Educational Evaluation*, *71,* 101099. https://doi.org/10.1016/j.stueduc.2021.101099.

Liu, Y., & Liao, W. (2019). Professional development and teacher efficacy: Evidence from the 2013 TALIS. *School Effectiveness and School Improvement*, *30*(4), 487–509. https://doi.org/10.1080/09243453.2019.1612454.

Loughland, T. (2019). *Teacher adaptive practices: Extending teacher adaptability into classroom practice*. Springer. https://doi.org/10.1007/978-981-13-6858-5.

Loughland, T., & Alonzo, D. (2018). Teacher adaptive practices: Examining links with teacher self-efficacy, perceived autonomy support and teachers' sense of adaptability. *Educational Practice and Theory*, *40*(2), 55–70. https://doi.org/10.7459/ept/40.2.04.

Maggiori, C., Rossier, J., & Savickas, M. L. (2017). Career adapt-abilities scale–short form (CAAS-SF): Construction and Validation. *Journal of Career Assessment*, *25*(2), 312–325. https://doi.org/10.1177/1069072714565856.

Martin, A. J., Nejad, H., Colmar, S., Liem, G. A., & Collie, R. J. (2015). The role of adaptability in promoting control and reducing failure dynamics: A mediation model. *Learning and Individual Differences*, *38*, 36–43. https://doi.org/10.1016/j.lindif.2015.02.004.

Martin, S. D., McQuitty, V., & Morgan, D. N. (2019). Complexity theory and teacher education.

  Oxford Research Encyclopedia of Education.

  https://doi.org/10.1093/acrefore/9780190264093.013.479.

Mason, M. (2008). What is complexity theory and what are its implications for educational

  change? *Educational Philosophy and Theory*, *40*(1), 32–45.

  https://doi.org/10.1002/9781444307351.ch3.

Mason, S., & Matas, C. (2015). Teacher attrition and retention research in Australia: Towards a

  new theoretical framework. *Australian Journal of Teacher Education*, *40*(40).

  https://doi.org/10.14221/ajte.2015v40n11.3

McIlveen, P., Perera, H. N., Baguley, M., van Rensburg, H., Ganguly, R., Jasman, A., &

  Veskova, J. (2018). Impact of teachers' career adaptability and family on professional

  learning. *Asia-Pacific Journal of Teacher Education*, *47*(2), 103–117.

  https://doi.org/10.1080/1359866x.2018.1444141

McMurtry, A. (2009). Complexity theory 101 for educators: A fictional account of a graduate

  seminar. *Articles*, *43*(3), 265–281. https://doi.org/10.7202/029699ar.

Melesse, T., & Belay, S. (2022). Uplifting teachers' professional capital through promoting

  engagement in professional learning: Mediating effect of teacher job satisfaction. *Cogent*

  Education, *9*(1). https://doi.org/10.1080/2331186x.2022.2057102.

Mirabeau, L., Mignerat, M., & Grange, C. (2013). Thirty Fourth International Conference on

  Information Systems. Milan.

Moreh, C. (2019). Online survey design and implementation: Targeted data collection on social

  media platforms. *SAGE Research Methods Cases Part 2*.

  https://doi.org/10.4135/9781526479709.

Morrison, K. (2002). *School Leadership and Complexity Theory.* London and New York,

Routledge/ Falmer. https://doi.org/10.4324/9780203603512.

Morrison, K. (2006). APERA Conference. In *Complexity theory and education* (pp. 1–12).

Macau, China; Macau Inter-University Institute.

Munda, N. (2021). The adaptability of public school teachers amidst the pandemic. *Central

Mindanao University Journal of Science*, *25*(1), 37–46.

https://doi.org/10.52751/pemw2173.

Nayak, M. S. D. P., & Narayan, K. A. (2019). Strengths and weaknesses of online surveys. *IOSR

Journal of Humanities and Social Sciences*, *24*(5), 31–38. https://doi.org/10.9790/0837-

2405053138.

NCES. (2019). Teaching and Learning International Survey (TALIS). Retrieved November 1,

2022, from https://nces.ed.gov/surveys/talis/index.asp.

NCES. (2020). *Digest of education statistics, 2020*. National Center for Education Statistics.

Retrieved October 9, 2022, from

https://nces.ed.gov/programs/digest/d20/tables/dt20_209.50.asp.

Ng, S. I., Lim, Q. H., Cheah, J.-H., Ho, J. A., & Tee, K. K. (2022). A moderated-mediation

model of Career Adaptability and Life Satisfaction among working adults in Malaysia.

Current Psychology, *41*(5), 3078-3092. https://doi.org/10.1007/s12144-020-00837-7.

Nie, Y., Lau, S., & Liau, A. (2012). The teacher efficacy scale: A reliability and validity study.

Asia Pacific Journal of Education, *21*(2), 414–421.

https://www.researchgate.net/publication/268978615_The_teacher_efficacy_scale_A_relia

bility_and_validity_study.

Nolan, A., & Molla, T. (2017). Teacher confidence and professional capital. *Teaching and Teacher Education*, *62*, 10–18. https://doi.org/10.1016/j.tate.2016.11.004.

Noormohammadi, S. (2014). Teacher reflection and its relation to teacher efficacy and autonomy. *Procedia-Social and Behavioral Sciences*, *98*, 1380-1389. https://doi.org/10.1016/j.sbspro.2014.03.556.

Nordick, S. (2017). *Fundamental features of fostering teacher collective efficacy: Principals' attitudes, behaviors, and practice* (dissertation).

O'Brennan, L., Pas, E., & Bradshaw, C. (2017). Multilevel examination of burnout among high school staff: Importance of staff and school factors. *School Psychology Review*, *46*(2), 165-176. https://doi.org/10.17105/spr-2015-0019.v46-2.

OECD. (2016). Supporting Teacher Professionalism: Insights from TALIS 2013. OECD Publishing. Paris. https://doi.org/10.1787/23129638.

Onyeukwu, V. E. (2022). Managing school climate by principals to enhance teacher's job satisfaction in secondary schools in Ebonyi State. *British International Journal of Education and Social Sciences*, *9*(2), 9–31.

Osborne, J. W., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research, and Evaluation*, *8*(2). https://doi.org/https://doi.org/10.7275/r222-hv23.

Park, K. A., & Johnson, K. R. (2019). Job satisfaction, work engagement, and turnover intention of CTE Health Science Teachers. *International Journal for Research in Vocational Education and Training*, *6*(3), 224–242. https://doi.org/10.13152/ijrvet.6.3.2.

Parsons, A. W., Ankrum, J. W., & Morewood, A. (2016). Professional development to promote teacher adaptability. *Theory Into Practice*, *55*(3), 250–258. https://doi.org/10.1080/00405841.2016.1173995.

Parsons, S. A., Vaughn, M., Scales, R. Q., Gallagher, M. A., Parsons, A. W., Davis, S. G., Pierczynski, M., & Allen, M. (2018). Teachers' instructional adaptations: A research synthesis. *Review of Educational Research*, *88*(2), 205–242. https://doi.org/10.3102/0034654317743198.

Patrick, J. M. (2012). *The relationship of creativity and adaptability to teaching efficacy* (dissertation).

Pearson, L. C., & Hall, B. W. (1993). Initial construct validation of the teaching autonomy scale. *The Journal of Educational Research*, *86*(3), 172–178. https://doi.org/10.1080/00220671.1993.9941155.

Pegram, T., & Kreienkamp, J. (2021). Complexity Theory and Education in Times of Insoluble Problems. *NORRAG*, *6*(25), 125–130.

Perera, H. N., Maghsoudlou, A., Miller, C. J., McIlveen, P., Barber, D., Part, R., & Reyes, A. L. (2022). Relations of science teaching self-efficacy with instructional practices, student achievement and support, and teacher job satisfaction. *Contemporary Educational Psychology*, *69*, 102041. https://doi.org/10.1016/j.cedpsych.2021.102041.

Protheroe, N. (2008). *Teacher efficacy: what is it and does it matter?* National Association of Elementary School Principals. https://www.naesp.org/sites/default/files/resources/1/Pdfs/Teacher_Efficacy_What_is_it_and_ Does_it_Matter.pdf.

Quartz, K. H., Thomas, A., Anderson, L., Masyn, K., Lyons, K. B., & Olsen, B. (2008). Careers

in motion: A longitudinal retention study of role changing among early-career urban

educators. *Teachers College Record: The Voice of Scholarship in Education*, *110*(1), 218–

250. https://doi.org/10.1177/016146810811000102.

Richardson, M., Isaacs, T., Barnes, I., Swensson, C., Wilkinson, D., & Golding, J. (2020). (rep.).

Trends in International Mathematics and Science Study (TIMSS) 2019: National report for

England. UCL Institute of Education.

Rottinghaus, P. J., Day, S. X., & Borgen, F. H. (2005). The Career Futures Inventory: A measure

of career-related adaptability and optimism. *Journal of Career Assessment*, *13*(1), 3–24.

https://doi.org/10.1177/1069072704270271

Rzevski, G. (2019). Complexity and adaptability in nature and Society. *Frontiers in*

Biomaterials, 38–52. https://doi.org/10.2174/9789811406898119060005.

Savickas, M. L. (1997). Career adaptability: An integrative construct for life-span, life-space

theory. *The Career Development Quarterly*, *45*(3), 247–259.

https://doi.org/10.1002/j.2161-0045.1997.tb00469.x

Savickas, M. L., & Porfeli, E. J. (2012). Career adapt-abilities scale: Construction, reliability,

and measurement equivalence across 13 countries. *Journal of Vocational Behavior*, *80*(3),

661–673. https://doi.org/10.1016/j.jvb.2012.01.011.

Skaalvik, E. M., & Skaalvik, S. (2014). Teacher Self-Efficacy and Perceived Autonomy:

Relations with Teacher Engagement, Job Satisfaction, and Emotional Exhaustion.

Psychological Reports, 114(1), 68–77. https://doi.org/10.2466/14.02.pr0.114k14w0.

Solly, B. (2018). Professional capital in your school. *SecEd, 2018*(8), 10-10.

https://doi.org/10.12968/sece.2018.8.10.

Strong, L. (2012). *A psychometric study of the teacher work-autonomy scale with a sample of U.S. teachers* (dissertation). Lehigh Preserve, Bethlehem, PA.

Swanson, P. (2010). Teacher efficacy and attrition: helping students at introductory levels of language instruction appears critical. *Hispania*, *93*(2), 305-321.

Tai, R. H., Liu, C. Q., & Fan, X. (2007). Factors influencing retention of mathematics and science teachers in secondary schools: A study based on SASS/TFS. *Science Educator*, *16*(2), 27–32.

Tien, H. L. S., Wang, Y. C., Chu, H. C., & Huang, T. L. (2012). Career adapt-abilities scale — Taiwan form: Psychometric properties and construct validity. *Journal of Vocational Behavior*, *80*(3), 744–747. https://doi.org/10.1016/j.jvb.2012.01.010.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783–805. https://doi.org/10.1016/s0742-051x(01)00036-1.

Voigt, S. (2021). *Supporting the bridge: Rural leaders' influences on systems to promote teacher professional capital growth* (dissertation).

Wan, Y., Nguyen, T., Lazarev, V., Zacamy, J., & Gerdeman, D. (2021). Outcomes for early career teachers prepared through a pilot residency program in Louisiana (REL 2021–079). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest. Retrieved from http://ies.ed.gov/ncee/edlabs.

Wang, K., Li, Y., Luo, W., & Zhang, S. (2019). Selected factors contributing to teacher job satisfaction: A quantitative investigation using 2013 TALIS data. *Leadership and Policy in Schools*, *19*(3), 512–532. https://doi.org/10.1080/15700763.2019.1586963.

Wangari, N. S., & Orodho, J. A. (2014). Determinants of job satisfaction and retention of special education teachers in primary schools in Nairobi County, Kenya. *IOSR Journal of Humanities and Social Science*, *19*(6), 126–133. https://doi.org/10.9790/0837-1967126133.

Wernli, D., Tediosi, F., Blanchet, K., Lee, K., Morel, C., Pittet, D., Levrat, N., & Young, O. (2021). A complexity lens on the COVID-19 pandemic. *International Journal of Health Policy and Management*. https://doi.org/10.34172/ijhpm.2021.55.

Will, M. (2022, April 15). *Teacher job satisfaction hits an all-time low*. Education Week. Retrieved April 15, 2022, from https://www.edweek.org/teaching-learning/teacher-job-satisfaction-hits-an-all-time-low/2022/04.

Wong, E. S., & Heng, T. N. (2009). Case study of factors influencing jobs satisfaction in two Malaysian universities. *International Business Research*, *2*(2), 86–98. https://doi.org/10.5539/ibr.v2n2p86.

Worth, J., & Van den Brande, J. (2020). *Teacher autonomy: How does it relate to job satisfaction and retention?* National Foundation for Educational Research.

Yolcu, O., & Akar-Vural, A. (2020). A scale development study on measuring science teachers' autonomy on curriculum. *Uluslararası Eğitim Programları Ve Öğretim Çalışmaları Dergisi*, *10*(1), 29–52. https://doi.org/10.31704/ijocis.2020.002.

Yolcu, O., & Akar-Vural, R. (2021). An examination of instructional autonomy practices of Science Teachers. *International Journal of Educational Methodology*, *7*(1), 79–94. https://doi.org/10.12973/ijem.7.1.79.

Yoon, I., & Kim, M. (2022). Dynamic patterns of teachers' professional development participation and their relations with socio-demographic characteristics, teacher self-

efficacy, and job satisfaction. *Teaching and Teacher Education*, *109,* 103565.

    https://doi.org/10.1016/j.tate.2021.103565.

Yu, H., Dai, Y., Guan, X., & Wang, W. (2020). Career adapt-abilities scale–short form (CAAS-

    SF): Validation across three different samples in the Chinese context. *Journal of Career*

    Assessment, *28*(2), 219–240. https://doi.org/10.1177/1069072719850575.

Zakariya, Y. F. (2020). Investigating some construct validity threats to TALIS 2018 teacher job

    satisfaction scale: Implications for social science researchers and Practitioners. *Social*

    Sciences, *9*(4), 38. https://doi.org/10.3390/socsci9.

APPENDIX A

Professional Capital, Teacher Adaptability, and Job Satisfaction

Research Survey

The purpose of this survey is to collect to examine the relationship between teacher adaptability and the job satisfaction of secondary science teachers. This research project is being conducted by Kristy Floyd, a Ph.D. candidate at Coastal Carolina University. You are invited to participate in this research project because you are a middle or high school science teacher.

Your participation in this research study is completely voluntary. You may choose not to participate or if you choose to participate, you may withdraw at any time during the process without any penalty or recourse. The procedure involves completing an online survey that will take approximately 12 minutes. Your responses will be completely confidential, and I will not collect identifying information such as your name, email address, IP address, or school. All data will be stored in a password-protected electronic format and will be destroyed after the research study is completed. The results of this study will be used for scholarly purposes only and any information shared will be done anonymously.

This research has been reviewed according to the Coastal Carolina University IRB procedures for research involving human subjects (#). If you have any questions about the survey or the research study, please contact Kristy Floyd at kafloyd@coastal.edu.

The following statements are grouped by factors that impact or influence teacher adaptability, self-efficacy, and job satisfaction. Based on your professional experience, consider how these factors have personally impacted or influenced you and/or your teaching. Read each statement carefully and determine to what degree these factors have impacted you. Then, indicate the strength of these factors' impact on your profession and job satisfaction by selecting the appropriate rating on the 5-point scale. The rating scale is shown at the top of each page.

Response Scale Description

Strength of Agreement	1 Strongly Disagree	2 Moderately Disagree	3 Neutral	4 Moderately Agree	5 Strongly Agree

Examples:

I have control over what I teach in my classroom   1   2   3   4   5
If you feel very strongly that you have control over classroom instruction, you would circle number 5.

My administration supports teacher collaboration.   1   2   3   4   5
If you feel strongly that this does not occur, you would circle number 1.

Teacher Adaptability					
Professional Knowledge & Experience	**7 Statements**				
1. I can develop new ideas for teaching and learning (RQ1) (TALIS) (HC-S)	1	2	3	4	5
2. I search for new ways to solve professional problems (RQ1) (CAAS-SF modified) (HC-E)	1	2	3	4	5
3. My teaching experience helps me to adapt to new classroom situations (RQ1) (CAAS-SF modified) (HC-K)	1	2	3	4	5
4. I find it difficult to change my daily classroom routines and procedures (RQ1-AD) (DC)	1	2	3	4	5
5. I do not feel comfortable using a variety of teaching and assessment strategies (RQ1) (TALIS modified) (HC-E)	1	2	3	4	5
6. I regularly try different instructional strategies to find what works best for me and my students (RQ1) (HC-S)	1	2	3	4	5
7. Optional Open Response: How have your teaching experiences helped or hindered your professional adaptability?					
Adaptive Space	**9 Statements**				
8. If an assignment is determined to be too easy or difficult for my students, I have the freedom to modify it to the correct level of difficulty (RQ1) (TES) (DC)	1	2	3	4	5
9. I do not have control over the classroom testing and scoring criteria for student achievement and assessment (RQ1) (TWA modified) (DC)	1	2	3	4	5
10. I have control over the teaching materials and instructional resources for my instruction (RQ1) (TWA modified) (DC)	1	2	3	4	5
11. I am given the freedom to modify labs and lab materials based on my instructional needs (RQ1) (DC)	1	2	3	4	5
12. I have the freedom to choose which professional development and training to attend based on my needs (RQ1) (TWA modified) (DC)	1	2	3	4	5
13. My administration does not support the utilization of new instructional methods and strategies (RQ1) (SC-A)	1	2	3	4	5

14. I feel comfortable sharing ideas with my colleagues. (RQ1) (SC-C)	1	2	3	4	5
15. I regularly choose to collaborate with other teachers to exchange instructional ideas and materials. (RQ1) (TALIS modified) (SC-C)	1	2	3	4	5
16. Optional Open Response: How do you feel your instructional autonomy and collaboration have helped or hindered your professional adaptability?					
Administrative Support	**7 Statements**				
17. My administration gives me the freedom to adapt the curriculum to fit the needs of my students (RQ1) (DC)	1	2	3	4	5
18. My administration encourages me to adapt my classroom instruction based on my teaching style (RQ1) (DC)	1	2	3	4	5
19. My administration considers novel ideas and solutions when making changes to school practices. (RQ1) (SC-A)	1	2	3	4	5
20. My administration does not encourage teachers to 'think outside the box' to solve problems (RQ1) (SC-A)	1	2	3	4	5
21. My administration supports and encourages teacher collaboration to generate new ideas and solve problems (RQ1) (SC-A)	1	2	3	4	5
22. I am not provided with adequate professional development or training for all new initiatives, programs, policies, and mandates that impact my classroom instruction (RQ1) (SC-R)	1	2	3	4	5
23. Optional Open Response: How do you feel your administration has helped or hindered your professional adaptability?					
Self-Efficacy	**8 Statements**				
24. I modify my instruction to meet student needs, so I can get through to the most difficult students. (RQ1) (TES-SF modified) (HC-S)	1	2	3	4	5
25. If one of my students could not do a class assignment, I know how to accurately assess whether the assignment was at the correct level of difficulty (RQ1) (TES-SF modified) (HC-K)	1	2	3	4	5

26. I have enough experience and training to deal with almost any learning problem (RQ1) (TES modified) (HC-K)	1	2	3	4	5
27. When a student is having difficulty with an assignment, I am usually able to adjust it to his/her level (RQ1) (TES) (HC-S)	1	2	3	4	5
28. When a student gets a higher grade than normal, it is usually because I found better ways of teaching that student (RQ1) (TES modified) (HC-K)	1	2	3	4	5
29. I do not feel confident modifying my instruction to meet student needs (RQ1) (HC-E)	1	2	3	4	5
30. I lack control over decisions made about classroom/school matters (RQ1) (DC)	1	2	3	4	5
31. Optional Open Response: How do you feel that your ability and freedom to modify your instruction impact your sense of self-efficacy?					
Job Satisfaction	**9 Statements**				
32. I am satisfied with my ability to adapt to changes in professional requirements or expectations (RQ2) (TALIS modified) (HC-E)	1	2	3	4	5
33. I am satisfied with the amount of support my administration provides regarding the curriculum modifications I make to classroom instruction (RQ2) (SC-A)	1	2	3	4	5
34. I am satisfied with the amount and quality of professional development or training for the new initiatives, programs, policies, and mandates that impact my classroom instruction (RQ2) (SC-R)	1	2	3	4	5
35. I am not satisfied with the amount of control I have over determining course content. (RQ2) (TALIS modified) (DC)	1	2	3	4	5
36. I am satisfied with the amount of control I have over choosing my teaching methods. (RQ2) (TALIS modified) (DC)	1	2	3	4	5
37. I am not satisfied with the control I have over choosing the methods of assessing my students. (RQ2) (TALIS modified) (DC)	1	2	3	4	5
38. I am satisfied with the amount of control I have over which instructional materials I use. (RQ2) (TALIS modified) (DC)	1	2	3	4	5

39. I am satisfied with the amount and quality of time to collaborate with other teachers about instruction (RQ2) (TALIS modified) (SC-C)	1	2	3	4	5
40. Optional Open Response: How do you feel your freedom and ability to adapt affect your job satisfaction?					

Demographic Variables

Sex: male/female

Your age: (drop-down box)

Grade level you teach: (drop-down box)

Number of years you have taught: (drop-down box)

COVID-19 (teach from 2019-2021) and (in person, hybrid, distance)

Number of different schools: (drop-down box)

Number of different grades: (drop-down box)

Science: Includes science, physics, physical science, chemistry, biology, human biology, environmental science, agriculture/horticulture/forestry