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INVESTIGATING THE RELATIONSHIP BETWEEN TEACHER AGENCY,
STUDENT ENGAGEMENT, AND STUDENT ACHIEVEMENT

By

CATHERINE HAWTHORNE-KOCAK

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

IN

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DOCTOR OF PHILOSOPHY DISSERTATION

OF

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Abstract

This study seeks to determine the relationship that exists between the average level of teachers' perceived sense of agency in a given school and the achievement of that school's students, with average levels of student engagement as a possible mediating variable. The research questions are: RQ1 - Do schools with higher contextual and relational support of teacher agency (SUP) have higher student achievement (ACH), and RQ2 - does student engagement (ENG) mediate the effects of contextual and relational support of teacher agency on student achievement. To answer these questions, survey data were collected from over 63,000 students and 10,000 educators in 231 public elementary and middle schools in 52 districts in Rhode Island. An exploratory factor analysis was first conducted to establish validity and reliability of the constructs of student engagement and contextual and relational support of teacher agency. Mediation analysis was then used to explore the relationship between these two constructs and student achievement. The results showed that the average contextual and relational support of teacher agency at the school-level is strongly and positively related to students' math and English language arts achievement. The school's average student engagement mediates this effect. This mediation effect is particularly strong in mathematics achievement. Implications for policy and practice as well as suggestions for future research are discussed.

Keywords: teacher agency, student achievement, student engagement

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TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Figures	vi
List of Tables.....	vii
CHAPTER ONE: INTRODUCTION	1
Theoretical framework.....	3
Conceptual framework.....	4
CHAPTER TWO: REVIEW OF THE LITERATURE	9
Teacher agency.....	9
Connection to student level outcomes.....	10
Outcomes of agency.....	12
Student engagement	13
Supporting teacher agency	14
Research questions and hypotheses	16
CHAPTER THREE: METHODOLOGY	18
Site	18
Dataset.....	18
Sample.....	19
Instruments and measures	19
Predictor variable	19
Outcome variable	21
Hypothesized mediator variable.....	22
Controls	23
Data analysis	24
Item analysis	24
Mediation analysis	25

CHAPTER FOUR: RESULTS	29
Item analyses	29
Teacher survey	29
Student survey	29
Null model.....	30
Baseline model	30
Research question1.....	31
Math achievement	31
English language arts achievement	31
Research question 2a.....	32
Research question 2b.....	33
Math achievement	33
English language arts achievement	33
CHAPTER FIVE: CONCLUSION.....	37
Discussion	37
ACH and SUP	37
ENG and SUP	38
ACH on SUP and ENG	39
Limitations	40
Implications.....	41
Conclusion	43
Appendix A	44
Appendix B	46
Bibliography.....	47

List of Figures

Figure 1. Mediation relationship between support of teacher agency, student engagement, and student achievement.....	17
Figure 2. Relationship between SUP and mACH (left), eACH (right).....	38
Figure 3. The relationship between ENG and SUP.....	39

List of Tables

Table 1. School average support of teacher agency (SUP).....	21
Table 2. Student math and English language arts achievement (mACH, eACH)	22
Table 3. School average student engagement (ENG)	23
Table 4. Student demographic control variables (vector D)	24
Table 5. Results of fitting multilevel linear models predicting the relationship between student math achievement and school-level teacher support and student engagement, controlling for key student demographics	34
Table 6. Results of fitting multilevel linear models predicting the relationship between student English language arts achievement and school-level teacher support and student engagement, controlling for key student demographics	35
Table 7. Results of fitting an OLS linear model predicting average school levels of student engagement by average school levels of teacher support.....	36

CHAPTER ONE

INTRODUCTION

Teacher agency, or the teachers' ability to engage in thoughtful, social action, can be a powerful force in educational reform efforts (Bridwell-Mitchell, 2015). Unfortunately, it is often overlooked. Instead, there has been a twenty-year trend in national school reform measures, such as the No Child Left Behind Act (NCLB, 2002) and Race to the Top Program (Obama, 2009) to focus national attention on school accountability as a strategy for improving public education. School accountability is "the process of evaluating school performance on the basis of student performance measures" (Figlio & Loeb, 2011). How students score on standardized tests of math and reading is the measure of school quality and effectiveness.

Accountability is still a critical part of education reform. The latest Every Student Succeeds Act (ESSA, 2015) continued the focus on accountability for student learning as measured by annual assessments, requiring schools to submit accountability plans that include goals for standardized test proficiency. These assessments have now become the commonly used measures of the quality of schools (Ravitch, 2016).

Using these standardized scores as our method of evaluation has some unintended consequences. In viewing education from a business lens, Saltman (2018) notes that the focus of education becomes the efficiency and standardization of both teaching and the curriculum as measured by student performance on standardized tests. Because student achievement on these assessments is crucial to school and educator evaluation, they are given much attention. To raise student performance,

school administrators encourage teachers to use teaching practices that are tightly linked to these standardized assessments (Meyer & Rowan, 2006). The use of prescriptive curricula, standardized testing, and accountability measures have led to the de-professionalization of teaching (Priestley, Biesta, & Robinson, 2015). Using student test scores as an evaluation of teaching and schools has contributed to the widespread development of an instrumentalist view of teaching which focuses on the technical and rational aspects of teachers' work that can be easily measured and ignores the more complex and human aspects (Mockler, 2011). What results is the standardization of curriculum and instruction, an exaggerated emphasis on standardized test scores by education stakeholders, and a restriction of teachers' autonomy (Valencia, Place, Martin, & Grossman, 2006). Teachers' creativity, instructional practices, and decision-making are limited (Vaughn, 2013), and teachers report that their ability to develop trusting relationships with students is constrained by these standards based, high-stakes, condensed-curriculum environments (Lasky, 2005).

There is increasing managerialism and bureaucracy that accompanies this focus on standardization, and teacher agency is eroded (Evetts, 2011; Sahlberg, 2010). Buchanan (2015) names this change in education reform focus "structuration" and asserts that it has changed teachers' capacity to act (p. 712). Therefore, the teachers' ability to engage in thoughtful, social action is severely limited, and the potentially powerful force of teacher agency goes unrecognized.

The purpose of this research study was to investigate the complex concept of teacher agency and its relationship with student engagement and student achievement.

This study was framed by Vygotsky's (1978) understanding of sociocultural theory and Emirbayer and Mische's (1998) conceptualization of agency. The information gained from this study can be used to inform school and district decision-making in efforts to recognize and support the powerful potential of teacher agency. The following sections of this chapter will provide a concise examination of the theoretical and conceptual frameworks which were used in this study of teacher agency.

Theoretical Framework

Vygotsky's (1978) sociocultural theory is based on the idea that individual development and action has social origins and is mediated by cultural tools and contexts. Just as society affects the individual, the individual affects society. This reciprocal relationship that exists between the individual and society is shaped, constrained, and supported by the social and cultural contexts. In the example of teacher accountability given previously, the teachers' actions are greatly influenced by the expectations and culture within the school community. The school community and culture are, in turn, influenced by the teachers' actions. This relationship exists because cultural tools and social contexts shape the beliefs and values of the individual, therefore influencing the individual's action (Wertsch, 1991).

The tools and contexts that shape the individual are integral to this study of teacher agency, where teacher agency is defined as teachers' ability to engage in thoughtful, social action. More specifically, teacher agency will be defined in this study as the teacher's capacity for action within the present social and cultural context that is based on past experiences and aligned toward future goals (Emirbayer & Mische, 1998). In education reform, the culturally mediating tools that influence the

achievement of teacher agency include policy mandates, curriculum guidelines, and state standards (Lasky, 2005). Many of these things focus on the standardized test scores of the students. The contexts in which the teacher acts include primarily the school and district. For this study, it is within this sociocultural framework that the concept of teacher agency will be investigated.

Conceptual Framework: Agency

There are a wide range of understandings of the concept of agency. Factors included and often confused with agency are motivation, choice, freedom, habit, goal-seeking, and judgement, among others. The complexity of this concept makes it challenging to study, as there is often a lack of clarity about just what human agency means.

The idea of human agency can be traced back to the early Enlightenment when it was acknowledged that individuals had the ability to make rational choices and take action to shape their own life circumstances (Emirbayer & Mische, 1998). There has been much debate, however, about the nature of the concept of agency and whether agency or structure is more important in social action. Fuchs (2001) found that social theory tends to focus on either the macro view of agency (overly dependent on social structure and context with little acknowledgment of the agency of the individual) or the more individualized view of agency (ignoring the importance of structure and context). Some have attempted to merge these two ideas into a more complex understanding. Bourdieu (1977) has attempted to combine the two schools of thought with his conceptualization of “habitus”, asserting that human action is habitual, repetitive, and taken for granted. While this view supports the role of structure in

social action, it also takes into consideration the importance of the actor's past experiences. Giddens (1984) also worked to include both the importance of structure and agency with his theory of "structuration". This theory insists that social action is dependent on both individual agency and the social structures that support or constrain it.

For this study, a more detailed and complex definition of agency is needed. This more complete understanding of the interplay between agency and structure is offered by Emirbayer & Mische (1998). They have formulated an ecological theory of agency in which agency is defined as:

the "temporally embedded process of social engagement, informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)." (Emirbayer & Mische, 1998).

The complexity of this concept makes it challenging to study. There are many different variables at play in an individual's achievement of agency. An individual's capacity to apply past patterns of action and imagine future possibilities of action influences the achievement of agency in the contexts of the present moment. This definition highlights the importance of changing orientations in time, including the past, the present, and the future, as actors engage in social action. It suggests that actors understand their relationship to the past, present, and future in ways that greatly affect their actions. Their perception of agentic possibility within different structural contexts varies greatly as they see their world as more or less responsive to their purpose and effort (Emirbayer & Mische, 1998).

Agency builds upon the achievements, understandings, and action patterns of the past (Biesta & Tedder, 2007). The iterational dimension of agency uses schemas developed from past interactions (Emirbayer & Mische, 1998). In this way, actors' agency is directly linked to patterns of action in daily life. Possible choices of action, then, are limited by individual and collective histories. Formative experiences can play a significant role in shaping the schemas that actors use to understand and act in different contexts (Emirbayer & Mische, 1998). Reactivating past thought and action patterns results in maintained stability and order. Emirbayer & Mische (1998) assert that this sustains our institutions and identities and leads to reproduction of social patterns and structures.

The ability to envision possible future action is the projective dimension of human agency (Emirbayer & Mische, 1998). This requires creativity as hopes, fears, and desires are used to invent new possibilities of thought and action. The daily challenges and conflicts of social life are the driving forces of the projective dimension of agency. Goals, plans, objectives, dreams, wishes, desires, hopes, aspirations are essential to the achievement of agency.

The final dimension of human agency is the practical evaluative dimension which occurs in the present. Emirbayer & Mische (1998) explain that this dimension includes making judgments of different possible actions in response to changing situations. It is where an issue is recognized that requires some action, past experiences are applied, possible choices are deliberated, the decision to act is made, and there is the capacity to act effectively. Agency can only be acted out in this practical evaluative dimension.

Each of these three dimensions, the iterative, the projective, and the practical evaluative, plays a part in an actor's achievement of agency. The dimensions are not equally balanced in every situation, but all three dimensions have influence. One may dominate human action in a given situation, but a continual reconstruction of the past is required as actors try to respond appropriately to their present changing environments while attempting to control and shape their futures (Emirbayer & Mische, 1998). These actors are not merely individuals; they are acting within overlapping temporal and relational contexts. Agency is not merely a capacity of an individual, or a power that an individual possesses. It is the quality of action that an individual takes, and it can be different for an individual in different contexts. An individual who has achieved agency in one situation may not have achieved agency in another situation or at another time, as agency is constrained and supported by discursive, material, and relational resources available (Priestley, Biesta, & Robinson, 2015). This achievement of agency will always depend on these resources, the contextual and structural factors, and the individual's own efforts (Biesta & Tedder, 2007).

This study is organized into five chapters. This introduction chapter will be followed by Chapter Two's investigation of the conceptual framework of agency as it applies more specifically to teachers. I examine what structural factors support or constrain the achievement of teacher agency, what implications of agency exist for teachers, and what connections can be found with student level outcomes of engagement and achievement. This chapter ends with the research questions that are more specifically investigated. Chapter Three presents the methods and procedures,

including explanations of the instruments and data sets, which were used to answer the research questions. The results of the data analysis are presented in Chapter Four, and Chapter Five includes my final conclusions, including contributions, implications, and limitations of this study.

CHAPTER TWO

REVIEW OF THE LITERATURE

This review of the existing literature on teacher agency will begin with an explanation of what teacher agency is. Next will be a presentation of research that suggests connections between teacher agency and student level outcomes. The outcomes of teacher agency that have been identified for teachers themselves will be presented in the next section, followed by an examination of student engagement. Finally, there is a discussion of factors that support and encourage the achievement of teacher agency. The research questions and hypotheses guiding this study are presented at the end of this chapter.

Teacher Agency

Building on human agency theory, Priestley et al. (2015) explain the three dimensions of agency as it exists more specifically for teachers. The iterational dimension of teacher agency is influenced by the teacher's skills and knowledge, professional and personal beliefs, and values. A teacher's schemas and patterns of action stem from daily experiences in dialogue with colleagues, school culture, professional development, and teacher education. The projective dimension of teacher agency relies on a teacher's aspirations. Often, these teacher aspirations are short-term process goals, dealing with issues such as covering curriculum, engaging students, and managing the classroom environment. Finally, Priestley et al. (2015) identify factors affecting the practical-evaluative dimension of teacher agency such as the daily difficult decisions and conflicting pressures of the work. The time allotted for reflection and dialogue and the relationships within the hierarchy of the school

structure also play roles in the achievement of teacher agency. Even teachers with substantial capacity and strong visions for the future may not achieve agency in a context where it is too difficult or too risky.

Teacher agency is an achievement and not merely an individual capacity. It is made possible by past experiences, future aspirations, and present capacities and environmental conditions. Teachers' professional agency is "highly relational...embedded in professional interactions between teachers, pupils and their parents, as well as with other members of the school community. (Pyhältö, Pietarinen and Soini, 2015, p. 307). Therefore, "...any attempt to enhance teacher agency should not just focus on the capacities of individuals...but should at the very same time pay attention to the factors and dimensions that shape the ecologies of teachers' work" (Priestley et al., 2015, p.3).

This complexity of the construct of teacher agency is apparent. What requires more exploration is what role teacher agency may play in effective teaching. Next, we look for connections in the literature between teacher agency and student level outcomes.

Connection to Student Level Outcomes

Learning is a constructive process. It occurs throughout life, from birth until death, as individuals interact with their social and physical environment in purposeful experiences. Dewey (1918) refers to it as "a fostering, a nurturing, a cultivating process" (p. 10). It is how a society attempts to shape its young into independent, engaged citizens who are able to understand and solve complex problems collaboratively. Teachers are learners. They, too, construct knowledge by engaging

in discussion, collaboration, reflection, & questioning (Fosnot, 2005). It is the dialogue within the community that drives the thinking and learning (Fosnot & Perry, 2005). All the daily conversations with colleagues, administrators, parents, and students shape teachers' understandings of their past experience, their current context, and their future aspirations.

Dewey (1918) espoused the importance of the social environment in learning. Of particular significance is the interdependence of the members of the community and how the success of one comes with the support of others. This is also a necessary condition of a teacher's achievement of agency. Early pragmatists have insisted that action is not simply pursuing an end, but that the actions and the ends develop together in changing contexts through the reflection and reevaluation of the actors (Emirbayer & Mische, 1998). The environment provides "conditions that promote or hinder, stimulate or inhibit, the characteristic activities of a living being" (p.12).

The unique environment of the school results in a unity of outlook for all individuals, including students, teachers, and administrators. In an environment where teacher agency is supported and achieved, the students' experiences and learning will be similarly shaped and supported. In a school environment such as this, social action and behavior will be guided by collaborative reflection and reevaluation of all members of the community. Because learning, according to Dewey (1918), requires a supportive social environment, this constructivist theory of learning suggests the potential connection between teacher agency and student-level outcomes.

Outcomes of Agency

In the literature, agency has been linked to many positive implications. Welzel and Inglehart (2010) found that when people achieve higher levels of agency, they place greater value on freedom and have increased life satisfaction. Highly agentic teachers also have higher levels of teacher creativity (Sawyer, 2007). The achievement of agency is also argued to be necessary to professional development and learning (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013). These outcomes, while not specifically limited to individuals in the teaching profession, would have impacts in the classroom. Day (2007) concludes that teachers' well-being and commitment have a positive relationship with students' achievement levels.

In studying the achievement of agency specifically among teachers, Vähäsantanen (2015) concluded that teacher agency increases teacher ownership, responsibility, professional identity, and organizational commitment. Interestingly, these outcomes align with the current policy focus on accountability, although these are not measurable by student achievement scores. They also found that teacher agency was a significant factor in transforming educational practices.

Hadar and Benish-Weisman (2018) explored the outcomes related to teacher agency. They found that agency is instrumental in supporting teachers' openness to new experiences and innovation. Similarly, a study of teacher learning and leadership showed that teacher agency influences policy and practice in a variety of ways including innovation, creativity, and implementation of projects to improve practice and support student learning (Harris & Jones, 2019).

Student Engagement

With these positive implications of agency for teachers, then perhaps there are also implications for the students of these agentic teachers. Stein et al. (2016) found that teacher agency was the dividing factor between teachers whose students were highly engaged and those whose students were less engaged. Student engagement is a term that is broadly used in education contexts. The online Glossary of Education Reform (n.d.) defines it as “the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education.” The four different dimensions of agency that Finn & Zimmer (2012) identified include academic engagement (attentiveness and assignment completion), social engagement (following rules), cognitive engagement (asking questions and persisting with difficult tasks), and affective engagement (emotional involvement and belonging). They assert that student engagement is essential to learning.

Student engagement has a strong influence on student achievement (Education Week Research Center, 2014). Students who are engaged in their work achieve at higher levels than their less engaged peers. In a multi-level mediation study by Reyes, Brackett, Rivers, White, & Salovey (2012) controlling for school, teacher, and student characteristics, student ratings of “engagement” were a mediator in the relationship between the classroom climate and the students’ year end grades.

Supporting Teacher Agency

Jääskelä, Poikkeus, Vasalampi, Valleala, & Rasku-Puttonen (2016) studied the many factors that support the achievement of teacher agency and organized them into three categories: factors of individual agency, factors of relational agency, and factors of contextual agency. Individual agency is influenced by interest and motivation, self-efficacy, competence beliefs, and participation activity. Relational agency is influenced by the fair treatment and support from those in leadership, peer support, and trust. Finally, opportunities to influence and opportunities to make choices are factors of contextual agency. Of these three categories, relational and contextual agency are most easily influenced by the school environment and administration.

Lipponen and Kumpulainen (2011) further this understanding of how teacher agency is supported by explaining that people achieve agency in social practice. Teachers' work and learning are intricately tied to their social and cultural contexts. Collaboration among teachers, parents, administration and other professionals is critical to the achievement of teacher agency (Pantić, 2017). This collaboration results in strong relationships among the members of the community. These strong collegial relationships further enable the achievement of agency (Robinson, 2012).

Thinking happens in and through language. The wider the discourses available to teachers, the stronger the practical-evaluative and projective dimensions of agency, and the more likely the teachers are to achieve agency (Priestley et al., 2015). Professional relationships should be fostered allowing for generative dialogue. Teachers in a context where collaboration is limited struggle to achieve agency. Toom,

Pyhältö, & Rust (2015) assert that teachers' professional agency is supported or restricted by personal and contextual factors of the classroom, school or community. The importance of these contexts, then, should be taken seriously by public policy makers to ensure that teachers' achievement of agency is not hindered (Priestley et al., 2015).

Another essential factor in the achievement of teacher agency is teacher reflection. There is a synergistic relationship between critical reflection and the achievement of teacher agency in the school setting that should be encouraged and supported (Jones and Charteris, 2017). Reflection supports and increases agency, and agency supports and increases reflection. Other research suggests that teacher agency develops from this reflectiveness along with adaptivity, and support (Stein, Kintz, & Miness, 2016). Participation in professional dialogue about their work is necessary to teacher development and agency (Biesta et al., 2015). Support during critical reflection and dialogue is integral to the teacher's move to action (Sannino, 2010). Teachers who do not engage in reflection and dialogue concerning their practice may struggle to achieve agency.

The concept of teacher agency reviewed here is complicated. The literature is primarily concerned with the factors that influence the achievement of teacher agency and the ways that teacher agency can be supported. This seems to assume that teacher agency is beneficial to the learning of students. What seems to be lacking, however, is a substantial quantitative research base specifically linking teacher agency to student outcomes. More studies must be conducted to gather evidence of the importance of supporting teacher agency in our schools.

Research Questions and Hypotheses

This study contributes to the reviewed literature by examining the relationship between the contextual and relational support of teacher agency and student achievement. The potential mediating role of student engagement in this relationship is also investigated. From the review of the literature addressing teacher agency and its possible implications in the classroom, the following research questions and hypotheses were developed.

RQ1: Do students in schools with higher contextual and relational support of teacher agency (SUP) have higher student achievement (ACH)?

I hypothesize that schools which are identified as having strong contextual and relational support of teacher agency will have higher overall student achievement.

RQ2: Does student engagement (ENG) mediate the effects of contextual and relational support of teacher agency on student achievement?

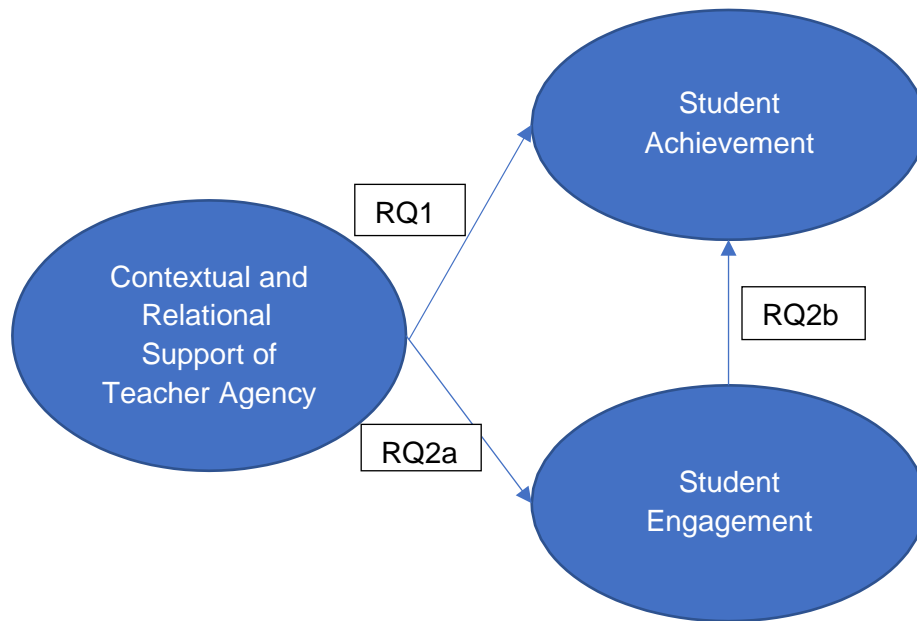
RQ2a: Do schools with higher SUP have higher ENG scores?

RQ2b: Do students in schools with higher SUP have higher ACH after including ENG as a covariate?

My hypothesis is that student engagement will mediate the effects of contextual and relational support for teacher agency. More specifically, I hypothesize that students in schools with higher levels of support for teacher agency will have higher achievement scores, schools with higher levels of support for teacher agency will have higher levels of student engagement, and that students in schools with higher levels of engagement will have higher achievement scores (Figure 1).

Figure 1

Mediation relationship between support of teacher agency, student engagement, and student achievement



In this chapter, the existing research on teacher agency, the factors that support its achievement, and links to possible implications for student achievement were explored. The next chapter will present the methodology used to examine the relationship between the contextual and relational support of teacher agency and student achievement, as well as the possible mediating effect that student engagement may have on that relationship. A clear description of the site, sample, and instruments will be given, along with a presentation of the specific steps that will be used in the mediation analysis.

CHAPTER THREE

METHODOLOGY

This chapter explains the methodology used in this investigation of the relationship between teacher agency and student achievement shown in Figure 1. First, I will describe in detail the site, data sets, and sample. Next the instruments used and the measurement of the variables in the study will be presented. The chapter ends with an explanation of the mediation analysis procedure that was used to determine to what extent student engagement mediated the relationship between teacher agency and student achievement.

Site

The data used for this study were collected during the 2018-2019 school year from the third through eighth grade students in all the public elementary and middle schools in a small state in the Northeast region of the United States.

Dataset

Two data sources were used. One data source was the annual, voluntary statewide survey that is administered to every educator and every third- through twelfth-grade student at each of the public schools within the state by the state's Department of Education. This data from the 2018-2019 school year is identifiable only at the school and district levels. The teacher survey data was used as a measure of the predictor variable, the teachers' perceived contextual and relational support for teacher agency in each school (SUP), and the student survey data was used to measure the hypothesized mediating variable of students' self-assessed level of engagement at each school (ENG).

The other data source used was the 2018-2019 statewide standardized math and English language arts achievement test student scores which were completely anonymized student level data. These data were used as a measure of student achievement (ACH).

All of the data sources used in this study were collected and curated by DataSpark from the state's department of education. DataSpark (n.d.) is a data group that maintains a large data warehouse and provides tools to help with data analysis. This group was tasked with collecting and curating this data to prepare it for analysis.

Sample

There were 63,164 students in grades three through eight who participated in the annual, statewide achievement testing in the 2018-2019 school year. These students were clustered into 231 schools which were in 52 districts. Approximately 40.9% of students were members of a historically underserved minority group, with 11% identified as ELL (English language learner), 14.1% identified as chronically absent, and 49.8 % qualifying for free or reduced-price lunch.

There were 5,878 educators who completed the voluntary survey (overall response rate approximately 78%). Again, all results were anonymous, only identifiable at the school level. Survey results for schools and districts were published on the state's Department of Education website and readily accessible to the general public.

Instruments and Measures

Predictor variable. The data used to measure the contextual and relational support of teacher agency (SUP) came from the state's annual survey administered to

the entire population of public-school teachers in the state (Panorama Education, 2014). The teacher survey included eighty-eight questions organized into ten different topics. However, only thirty-five of these questions were included in this measure of SUP.

The topics of the teacher survey that were used in this study were School Leadership, School Climate, Leadership Relationships, and Professional Learning. The reliability statistics of the topics used in this study were reported as School Leadership ($sd = 0.95$) and School Climate ($sd = 0.85$). The reliability statistics of Leadership Relationships and Professional Learning were not available (Chiatovich, personal communication, March 2, 2021).

Within the four survey topics, not every question related to the construct of contextual and relational support of teacher agency. For this reason, only responses to the questions regarding leadership, trust, support, collaboration, and reflection were used to measure SUP, as these are the contextual and relational factors supporting the achievement of teacher agency that were identified in the literature (Biesta, Priestley, & Robinson, 2015; Jääskelä, Poikkeus, Vasalampi, Valleala, & Rasku-Puttonen, 2016; Jones and Charteris, 2017; Lipponen & Kumpulainen, 2011; Pantić, 2017; Robinson, 2012; Sannino, 2010; Stein, Kintz, & Miness, 2016; Toom, Pyhältö, & Rust, 2015). This comparison of items to the literature was done to establish face validity of the measure. Some question examples include “How often do you communicate with colleagues about classrooms or professional learning?” and “How often do you participate in professional learning communities?” A complete list of teacher survey questions which were used in this study can be found in Appendix A.

Participation in the survey was voluntary, and answers were anonymous, identifiable only at the school level. Each of the survey question responses used a five-point Likert scale. The survey data from these 35 questions was aggregated by school to produce this measure of average contextual and relational support of teacher agency. The mean SUP for the 231 elementary and middle schools in this study was 3.29 (sd = 0.390) with a range of 2.33.

Table 1

School average support of teacher agency (SUP)

	SUP
N	231
Mean	3.29
Standard deviation	0.390
Range	2.33

Outcome variable. The outcome variable was student achievement. Math and English language arts achievement scores were analyzed separately. Math student achievement (mACH) and English language arts achievement (eACH) were measured using the statewide assessment scores for math and English language arts for all third through eighth grade students for the 2018-2019 school year. While the reliability of these assessments varied by subject and grade level, the range was Cronbach's $\alpha = 0.87-0.93$ (Rhode Island Department of Education, 2020, p. 20). This data was anonymized at the student level. The mean for math achievement was 488 (sd = 22.3). The English language arts achievement mean was 493 (sd = 23.7).

Table 2

Student math and English language arts achievement (mACH, eACH)

	mACH	eACH
N	63164	62468
Mean	488	493
Standard deviation	22.3	23.7
Range	120	120

Hypothesized mediator variable. Average school-level student engagement was investigated as a mediating variable. To measure this average student engagement (ENG), the state’s annual voluntary student survey data was used. The entire population of third grade through eighth grade students at each school was asked to complete the annual SurveyWorks survey by the state’s Department of Education. All results were anonymous, only identifiable at the school level. A total of 57,056 students completed the survey (overall response rate approximately 90%). Survey results for schools and districts were published on the state’s Department of Education website and readily accessible to the general public.

Student surveys included questions on eleven topics. One of these topics was school engagement. The validity of this subtopic of the survey was well established thru a survey design procedure that included a literature review, focus groups and interviews, research team item consensus, expert review, cognitive interviews, and

large-scale pilot testing (Panorama Education, 2015a). The reliability of the student engagement section of the student survey was also well established ($\alpha = 0.78$).

There were fifteen questions used to measure student engagement. Questions for this topic included “How excited are you about going to your classes?” and “When you are not in school, how often do you talk about ideas from your classes?” Each of the survey question responses used a five-point Likert scale. A complete list of survey questions which were used in this study can be found in Appendix B. This survey data was then aggregated by school to produce a measure of average student engagement (ENG). The average school student engagement had a mean of 3.52 (sd = 0.268).

Table 3

School average student engagement (ENG)

	ENG
N	231
Mean	3.52
Standard deviation	0.268
Range	1.30

Controls

Other demographic variables that were controlled for in this study based on prior research on student achievement include student gender, free and reduced-price lunch, English language learner, chronically absent and historically underserved minority. These variables have been strongly linked to student achievement in educational research. All five of these variables were included in the models as vector D. This vector was included to account for student-level variability. The percentage

of students in each grade level ranged from 16% to 17.2%. There were slightly more male students (51.2%) than female (48.8%). Members of historically underserved minority groups constituted 40.9% of the students, and 49.8% qualified for free and reduced-price lunch. Only 11% of students were English language learners, and 14.1% were identified as chronically absent.

Table 4

Student demographic control variables (vector D)

Frequencies of grade level

Levels	Counts	% of Total
Grade 3	10557	16.0 %
Grade 4	10768	16.3 %
Grade 5	11191	17.0 %
Grade 6	11347	17.2 %
Grade 7	11118	16.9 %
Grade 8	10972	16.6 %
Female	32211	48.8%
Historically Underserved Minority	26951	40.9%
Free/reduced Lunch status	32877	49.8%
English Language Learner	7285	11.0%
Chronically Absent	9306	14.1%

Data analysis

Item analysis. The first step of data analysis in this study was conducting item analyses on both the teacher survey data as a measure of contextual and relational

support of teacher agency (SUP) and the student survey data as a measure of student engagement (ENG) to further establish the reliability of these measures. Results of these analyses will be presented in Chapter Four.

Mediation analysis. Using the mediation study approach introduced by Baron and Kenny (1986), I used three equations to address my research questions:

1. Regress the outcome variables (mACH, eACH) on the predictor variable (SUP) (RQ1);
2. Regress the mediator variable (ENG) on the predictor variable (SUP) (RQ2a); and
3. Regress the outcome variable (mACH, eACH) on both the predictor variable (SUP) and the mediator variable (ENG) (RQ2b).

If student engagement has a mediating role in the effect of contextual and relational support of teacher agency on student achievement, then according to Baron and Kenny (1986), the following four conditions must be met:

1. The relationship between contextual and relational support of teacher agency (SUP) and student achievement (mACH, eACH) is both positive and statistically significant;
2. The relationship between contextual and relational support of teacher agency (SUP) and student engagement (ENG) is both positive and statistically significant;
3. The relationship between student engagement (ENG) and student achievement (mACH, eACH) continue to be positive and statistically

significant even when contextual and relational support of teacher agency (SUP) is included as a predictor variable; and

4. The magnitude of the relationship between contextual and relational support of teacher agency (SUP) and student achievement (mACH, eACH) is smaller when the mediator variable, student engagement (ENG), is included in the estimating equation than when the mediator variable is excluded.

RQ1: Do students in schools with higher contextual and relational support of teacher agency (SUP) demonstrate higher achievement (mACH, eACH)?

For both math and English language arts achievement, I first fit the null model with no variables to determine the variability of scores that existed at the student, school and district levels. Next, the following multi-level mixed model was fit

$$ACH_{ijk} = \gamma_{000} + \beta_1 D_{ijk} + \varepsilon_{ijk} + u_{0jk} + u_{0k}$$

where $(ACH)_{ijk}$ represents the achievement score of student i in school j in district k , γ_{000} is the mean student achievement score for the average student in school j in district k , vector D represents the set of control variables for student i in school j in district k , and ε_{ijk} , u_{0jk} , and u_{0k} represent the mean-zero error terms. The model fit statistics for this baseline model were compared to the null model to determine how the vector D student-level variables were related to students' math and English language arts achievement.

After fitting the baseline model, the next step was to investigate the relationship between the contextual and relational support of teacher agency and

student achievement including the predictor variable (SUP_{jk}). This was done using the following model

$$ACH_{ijk} = \gamma_{000} + \beta_1 D_{ijk} + \gamma_{01} SUP_{jk} + \varepsilon_{ijk} + u_{0jk} + u_{0k}$$

Because there were two measures of student achievement, this procedure was completed once with the math achievement scores (mACH) and then again with the English language arts scores (eACH). The magnitude, direction, and precision of the estimate of β was used to answer this research question. If the estimate was greater than the standard error, then this variable was considered statistically interesting. If the estimate was more than twice the standard error, then this variable was considered statistically significant.

RQ2: Does student engagement (ENG) mediate the effects of contextual and relational support of teacher agency on student achievement? The answer to this research question was investigated in two stages.

RQ2a: Do schools with higher SUP have higher ENG scores? In this question, both SUP and ENG were school-level averages. These measures were not available at the individual level. Again, multi-level modeling was used to fit the following equation

$$ENG_{jk} = \beta_{0jk} + \beta_1 SUP_{jk} + \varepsilon_{jk} + u_{0k}$$

As in RQ1, the magnitude, direction, and precision of β_1 will be used to answer this research question. If the estimate was greater than the standard error, then this variable was considered statistically interesting. If the estimate was more than twice the standard error, then this variable was considered statistically significant.

RQ2b: Do students in schools with higher SUP have higher ACH after including ENG as a covariate? For this final stage, I added in the mediator variable, ENG_{jk} , to the equation for RQ1.

$$ACH_{ijk} = \gamma_{000} + \beta_1 D_{ijk} + \gamma_{01} SUP_{jk} + \gamma_{02} ENG_{jk} + \varepsilon_{ijk} + u_{0jk} + u_{0k}$$

According to the Barron and Kenny (1986) mediation formulation, if the relationship between SUP and ACH is positive and significant in RQ1 and the relationship between ENG and SUP is positive and significant in RQ2a, then a positive and slightly weaker relationship in RQ2b between SUP and ACH after adding in ENG would suggest that student engagement mediates the relationship between contextual and relational support of teacher agency and student achievement.

This chapter presented a detailed description of the methodology that was used in this study of teacher agency and student achievement. In the following chapter, the results of this study will be presented beginning with the confirmatory factor analyses that were conducted on the teacher and student survey results, then continuing to the results of each of the research questions.

CHAPTER FOUR

RESULTS

The results of this study will be presented in four sections. To begin, the outcomes of the separate factor reliability analyses of the teacher survey data and the student survey data will be given. Then in the following sections, the results of the mixed linear modelling of each of the three research questions will be presented.

Item analyses

Teacher survey. To confirm the reliability and construct validity of this measure, an item analysis was conducted on the teacher survey question responses. The results of this exploratory analysis and the inter-item correlations indicated four unique components for these thirty-five questions. However, an additional principal components factor analysis of these components with varimax rotation identified a unidimensional construct. Therefore, these four components were aggregated into one measure of school average contextual and relational support of teacher agency. The thirty-five teacher survey question responses were all positively correlated (Cronbach's $\alpha = 0.959$). The inter-item correlations were all positive and ranged from 0.012 to 0.954. This confirmed the reliability of these items and provided initial evidence of construct validity. Each school's average of all 35 survey question responses together was the measure used for average contextual and relational support of teacher agency (SUP).

Student survey. To confirm the reliability of this measure of student engagement (ENG), a factor analysis with varimax rotation was conducted. One dominant component was identified in the fifteen survey questions. The questions

were also all positively correlated (Cronbach's $\alpha = 0.965$). The inter-item correlations had a range of 0.13 to 0.97. Each school's average of all 15 survey question responses was the measure used for average student engagement (ENG).

Null model

After conducting the item analysis for the teacher and student survey items, the first step of the mediation analysis was to build the null model. This model examined the variability in student math and English language arts achievement scores that existed without any including any predictor variables. I note in Model 1 of Tables 5 and 6 that in math achievement scores, approximately 6.5% of the variability in achievement scores could be attributed to school, and 18.1% could be attributed to district while in English language arts scores, 5.1% could be attributed to school, and 9.6% could be attributed to district when no predictor variables were included in the model.

Baseline model

After fitting the null model to find the proportion of variability at the school and district levels of the data, the next step was building a baseline multi-level model to predict the outcome (mACH, eACH) scores including only the vector D variables to determine how much of the variance could be attributed to student grade, gender, free and reduced-price lunch status, English language learner status, chronic absenteeism and historically underserved minority status at the school and district level. In this model, the factors in vector D were found to be important predictors of achievement scores. As shown in Model 2 of Tables 5 and 6, the variability in math achievement (mACH) that is attributed to school and district dropped to 5.1% and 9.6%

respectively, while the English language arts achievement (eACH) variability attributed to school and district dropped to 5.2% and 6.9%.

When the vector D demographic variables were added to the model of math achievement, the deviance decreased (555,830 to 548,970). Similarly, when the vector D demographic variables were added to the model of English language arts achievement, the deviance also decreased (556,966 to 547,344). These results indicate that the models are better-fit when the vector D demographic variables are included.

Research question 1

RQ1: Do students in schools with strong contextual and relational support of teacher agency (SUP) demonstrate higher achievement (mACH, eACH)?

Math achievement. A positive relationship existed between a school's contextual and relational support of teacher agency (SUP) and its students' math achievement (mACH) both with and without controlling for demographic variables. In Model 3 on Table 5, I present the results when controlling for demographic variables in this model where the estimate (2.42) is two and a half times (2.58) the standard error (0.93). This statistically significant relationship signals that a school's average support of teacher agency is significantly predictive of its students' math achievement. For example, in a school with an average SUP score one standard deviation unit higher, you would expect a prototypical student to have a math achievement score 2.42 units higher controlling for student demographics. This represents an effect size of approximately $d = 0.12$ standard deviation units.

English language arts achievement. A positive relationship also existed between a school's SUP and its students' English language arts achievement (eACH)

both with and without controlling for demographic variables. The results in Table 6 Model 3 show that when controlling for demographic variables in this model, the estimate (2.81) was almost three times (2.97) greater than the standard error (0.943), signaling that a school's average support of teacher agency is also a statistically significant predictor of its students' English language arts achievement. For example, in a school with an average SUP score one standard deviation unit higher, you would expect a prototypical student to have an English language arts achievement score 2.81 units higher controlling for student demographics. This represents a relatively small effect size of approximately $d = 0.13$ standard deviation units or a difference of about two weeks of learning in a given school year in this state (Rhode Island Department of Education, 2018).

Though support of teacher agency was predictive of both math and English language arts achievement scores, it was slightly more predictive of English language arts achievement.

Research question 2a

RQ2a: Do schools with higher SUP have higher ENG scores?

Preliminary analysis showed little variability in these two variables at the district level. While a two-level model had been proposed, the lack of variability at the district level identified in the null model justified the use of an ordinary least squares (OLS) regression model be used for this model. Both variables were school-level data. As shown in Table 7, the estimate (0.201) was over four and a half times (4.63) the standard error (0.0434) of this OLS regression of average student engagement (ENG) on support of teacher agency (SUP). School level average SUP accounted for 9% of the variability in ENG. This suggests a very strong positive

relationship exists between these two variables. For example, in a school with an SUP score that was one unit higher than another school, you would expect the ENG score to be 0.201 units higher. This represents an effect size of approximately $d = 0.292$ or a difference of a little more than 4 weeks of learning in a given school year (Rhode Island Department of Education, 2018).

Research question 2b

RQ2b: Do students in schools with higher SUP have higher ACH (mACH, eACH) after including ENG as a covariate?

Math achievement. As shown in Table 5 Model 4, in the presence of student engagement the strength of the relationship between a school's average SUP and mACH decreased. The estimate when ENG was included as a covariate (0.668) was slightly over half of the standard error (0.935). This is a large decrease compared to the estimate without ENG (2.416) that was two and a half times its standard error (0.933). The inclusion of SUP in the model resulted in little reduction in variance. Including ENG resulted in a much greater reduction. The between school variance decreased 2.4% when SUP was included in the model and 13.3% when SUP and ENG were included in the model. The relationship between the contextual and relational support of teacher agency and student math achievement decreased seventy-two percent when student engagement was included in the model. Student engagement greatly mediates this relationship.

English language arts achievement. Table 6 Model 4 shows that while the mediation affect was less pronounced for English language arts achievement than it was for math achievement, average student engagement (ENG) still mediated the relationship between a school's average SUP and English language arts achievement

(eACH). The magnitude of the estimated coefficient (2.24) decreased, with a standard error of 0.993 when compared to that same relationship without including ENG as a covariate. Without including ENG the estimate was 2.82 with a standard error of 0.943. The between school variance decreased 3.2% when SUP was included in the model and 1.4% when SUP and ENG were included in the model. When student engagement was added to the model, the relationship between contextual and relational support of teacher agency and student English language arts achievement decreased approximately twenty percent.

Table 5

Results of fitting multilevel linear models predicting the relationship between student math achievement and school-level teacher support and student engagement, controlling for key student demographics (n_district=52; n_school=231 n_students=63,163)

		Model 1.	Model 2.	Model 3.	Model 4.
		Null Model	Model 1 +Controls	Model 2 +Predictor	Model 3 +Mediator
<i>Fixed Effects</i>					
INTERCEPT	γ_{000}	492 <i>(1.45)</i>	481.73 <i>(0.99)</i>	481.40 <i>(0.97)</i>	481.09 <i>(0.99)</i>
SUP ^a	γ_{01}			2.42 <i>(0.93)</i>	0.67 (0.94)
ENG ^a	γ_{02}				7.42 <i>(1.38)</i>
STUDENT DEMOGRAPHICS	β_1		✓	✓	✓
<i>Variance Components</i>					
Level1 Residual	ϵ_{ijk}	383.6	344.6	344.6	344.6
Level 2 Residual	u_{0jk}	32.6	20.7	20.2	17.5
Level 3 Residual	u_{0k}	92.2	38.7	36.4	39.4
<i>Model Fit</i>					
-2LL		555,830	548,970	548,964	548,936

Note: ^aVariables standardized (m=0, sd=1). Fixed Effects cells are estimates (standard error). *Italicized indicates estimate > se, **Bold indicates estimate > 2*se.***

Table 6

Results of fitting multilevel linear models predicting the relationship between student English language arts achievement and school-level teacher support and student engagement, controlling for key student demographics (n_district=52; n_school=231 n_students=62,467)

		Model 1.	Model 2.	Model 3.	Model 4.
		Null Model	Model 1 +Controls	Model 2 +Predictor	Model 3 +Mediator
<i>Fixed Effects</i>					
INTERCEPT	γ_{000}	497 <i>(1.43)</i>	485.41 <i>(0.889)</i>	485.04 <i>(0.87)</i>	484.93 <i>(0.88)</i>
SUP ^a	γ_{01}			2.81 <i>(0.94)</i>	2.24 <i>(0.993)</i>
ENG ^a	γ_{02}				2.47 <i>(1.47)</i>
STUDENT DEMOGRAPHICS	β_1		✓	✓	✓
<i>Variance Components</i>					
Level1 Residual	ϵ_{ijk}	430.7	370.0	370.0	370.0
Level 2 Residual	u_{0jk}	40.1	21.7	21.0	20.7
Level 3 Residual	u_{0k}	86.8	28.9	26.4	27.0
<i>Model Fit</i>					
-2LL		556,966	547,344	547,336	547,332

Note: ^aVariables standardized (m=0, sd=1). Fixed Effects cells are estimates (standard error). *Italicized indicates estimate > se, **Bold indicates estimate > 2*se.***

Table 7

Results of fitting an OLS linear model predicting average school levels of student engagement by average school levels of teacher support (n school = 231)

		Model 1
<i>Fixed Effects</i>		
INTERCEPT	β_0	2.86 <i>(0.14)</i>
SUP	β_1	0.20 <i>(0.04)</i>
<i>Model Fit</i>		
R ²		0.09

Note: Fixed Effects cells are estimates (standard error). *Italicized indicates estimate > se, **Bold indicates estimate > 2*se.***

The results of the analyses have been presented in this chapter. The next chapter will include a discussion of these results and how they relate to the literature, the conclusions that can be drawn from these results, and the potential limitations of the study. Suggestions for future investigations based on these conclusions will also be proposed.

CHAPTER FIVE

CONCLUSION

The previous chapter presented the results of the analyses of the relationship between a school's average contextual and relational support of teacher agency and student math and English language arts achievement as well as the mediation effect that a school's average student engagement has on that relationship. This chapter will discuss these data and ground them in the existing literature. The limitations of this study will be examined, and future implications will be suggested.

Discussion

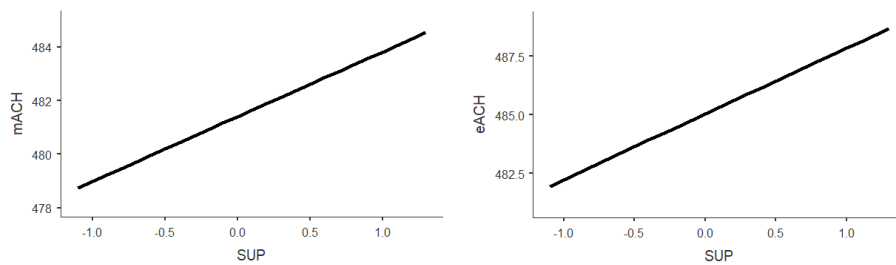
ACH and SUP. In the literature, a clear link had been found between student engagement and student achievement (Education Week Research Center, 2014). A link had also been found between teachers who had achieved high levels of agency in their schools and classrooms and their students' engagement in their classes (Stein et al., 2016). In my review of the literature, however, no direct link had been found between teacher agency and student achievement.

Another alternative model could also exist where teachers in a school with higher average support for teacher agency are more willing to seek help and improve their practice. In future studies, individual level survey responses would be necessary to investigate this possibility.

Because the construct of teacher agency is multi-faceted, this study more specifically examined how a school's contextual and relational support of teacher agency might relate to its students' achievement. From this analysis, a relationship between these two factors was found to exist. Overall, students in schools with higher average contextual and relational support of teacher agency (SUP) had higher

achievement scores in both math (mACH) and English language arts (eACH). The data show that this average SUP was more influential in English than in math. In a school with one standard deviation higher average SUP, student math achievement scores would be 2.416 points higher, and student English language arts scores would be 2.81 points higher on average.

Figure 2. *Relationship between SUP and mACH (left), eACH (right).*

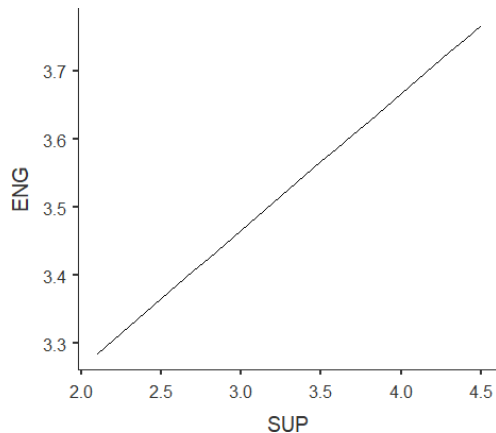


Note: SUP values are standardized (m=0, sd=1)

ENG and SUP. The next step of this mediation analysis required exploration of the possible relationship between the contextual and relational support of teacher agency (SUP) and student engagement (ENG). Stein et al. (2016) identified teacher agency as a key element in engaging students. They found that highly agentic teachers exhibited reflectiveness, adaptiveness, and support that lead to increased student engagement. Similarly, this analysis showed similar links between teacher agency and student engagement. However, this analysis looked at the environment that supports the achievement of teacher agency and overall average student engagement instead of the agency of individual teachers and their specific students. School average measures of contextual and relational support of teacher agency were a significant predictor of the school average student engagement.

Figure 3

The relationship between ENG and SUP



ACH on SUP and ENG. After establishing the relationship between SUP and ACH and the relationship between SUP and ENG, the final step of this analysis was determining if a school's average student engagement (ENG) was a mediating factor. This mediation affect was not directly suggested in the literature. However, with the relationships between SUP and ENG and ENG and ACH found in the literature, the existence of this mediation seemed plausible. From the analysis we see that a school's average student engagement (ENG) does mediate the relationship between the average support of teacher agency (SUP) and its students' achievement scores in both math and English language arts (mACH, eACH). In the data we see that school average ENG has more influence on student achievement than SUP. However, a relationship between SUP and ACH still exists when adding ENG as a covariate specifically for English language arts achievement.

These results offer clear validation of the theoretical model suggested in this study. There are clear links between school average contextual and relational support

of teacher agency and student achievement in both math and English language arts, although the link is stronger in math achievement. Both links are mediated by the school's average student engagement, though not to the same degree.

Limitations

In this study, teacher agency was assumed to influence student engagement. This was because there was evidence of that relationship in the literature. The possibility exists, however, of an alternate model. It could be that a school's average student engagement influences its contextual and relational support of teacher agency. In addition, there could be some other factor that is influencing these two things positively. Future studies might investigate alternate models of this complicated relationship using other datasets to further our understanding of teacher agency, student achievement, and student engagement.

This study used survey data as a measure both of student engagement and of contextual and relational support of teacher agency. This self-reported data presents the possibility of response bias (Dillman, Smyth, & Christian, 2014), although the anonymity of the data should minimize that threat. The use of survey data also presents the possibility of non-response error which may occur when the respondents differ in some way from the non-respondents (Dillman et al, 2014). However, the robust response rates for both surveys (students 90%, teachers 78%) limit the possibility of any significant non-response error.

Another limitation to consider is due to the aggregation of data for the measures of SUP and ENG. These measures were school-level averages. This may have resulted in an increased correlation between the measures as well as masked potential directional correlations. The within school relationships could differ from

the between school relationships. To address this, I would need individual level data for these two measures. This could be an area for future research.

Despite these limitations, the methodology used was efficient and appropriate for investigating the research questions. There was a large dataset for analyzing the variables. This provided more generalizable results. The data sources used were widely accepted by administrators and policymakers as valid and reliable measures of student achievement and student and teacher attitudes regarding school, teaching, and learning.

Implications

This study investigates the relationship between contextual support of teacher agency and student achievement with student engagement as a possible mediating variable. Understanding this relationship is essential to any education reform work that aims to improve student achievement. The results of this study demonstrate the importance of supporting teacher agency in our schools to increase our students' learning.

The specific contextual and relational practices that support teacher agency that were examined in this study were teacher dialogue, reflection, support, and opportunities to influence. Teachers must have frequent opportunities to engage in collaboration with colleagues as an integral part of the school day and not as an "extra" activity to be completed if time allows. This collaboration among members of the school community leads to increased ownership and collective responsibility (Vahasantanen, 2015). This discussion should encourage and value the voices of teachers as professionals. Teachers should be involved with decision-making and

curriculum. More balance is needed between teacher autonomy and accountability (Boote, 2006). Finally, teacher innovation in the classroom should be supported by administrators and colleagues.

The recommendations of reflection, dialogue, support, and opportunities to influence are not distinct. There is much overlap between them. While they are primarily school-level practices, they will require support at the district, state, and national levels as well. The additional time requirements will undoubtedly need some reallocation of school and district funds. State and national education authorities will need to recognize, encourage, and financially support new reform initiatives that focus on the development of school environments where teacher agency is valued. Schools in more economically disadvantaged areas will need more support with funding these changes. With an intentional focus on making improvements in these areas, teacher agency will increase as the socio-contextual climate becomes one of respect, value, responsibility, and even accountability. This accountability will not be solely tied to the standardized test scores of the students. The highly agentic teachers, themselves, will have improved well-being and stronger organizational commitment, holding themselves accountable for the learning of their students and leading to higher student achievement. By encouraging teacher agency, we increase teacher quality and professionalism which in turn results in improved educational equity and achievement for our students.

The results of this study could lead to future studies examining specific schools or districts that demonstrate particularly high levels of support for teacher agency to gain a more elaborate understanding of how this can be accomplished and provide a

model for other schools or districts. Other future avenues for extensions of this knowledge include conducting longitudinal studies of the survey and achievement data to determine the consistency of the relationships in recent years and to identify any trends that may emerge from the data as recent reform initiatives have been enacted. Finally, investigations of levels of teacher agency and disadvantaged student populations such as ELL or underserved minority students may also uncover significant relationships that exist.

Conclusion

From the literature reviewed, we learned that teacher agency is not an innate characteristic that a person simply has or does not have. Teacher agency is an accomplishment that can be supported or discouraged. Its implications include higher levels of teacher creativity, motivation, and professional development. What was not clear in the literature reviewed is whether it has any connection to student achievement. In the current educational climate where achievement scores are analyzed and used for a variety of evaluative purposes, any positive relationship with these test scores that can be identified is worthy of attention and consideration. The average contextual and relational support of teacher agency at the school-level is strongly and positively related to both student math and English language arts achievement. The school's average student engagement mediates this effect. This mediation effect is particularly strong in mathematics achievement. Higher average student engagement was positively related to higher student math scores. This study brings to light the important role that contextual and relational support of teacher agency, a factor that is largely ignored, might play in students' math and English language arts achievement and the mediating effect of student engagement.

Appendix A

Teacher Survey Questions

1. To what extent are teachers trusted to teach in the way they think is best?
2. How positive are the attitudes of your colleagues?
3. Overall, how positive is the working environment at your school?
4. At your school, how valuable are the available professional development opportunities?
5. How helpful are your colleagues' ideas for improving your teaching?
6. How much input do you have into individualizing your own professional development opportunities?
7. Through working at your school, how many new teaching strategies have you learned?
8. Overall, how much do you learn about teaching from the leaders at your school?
9. How often do your professional development opportunities help you explore new ideas?
10. How relevant have your professional development opportunities been to the content that you teach?
11. Overall, how supportive has the school been of your growth as a teacher?
12. How often do you meet with colleagues, coaches, or administrators to do professional learning activities?
13. How often do you communicate with colleagues about classrooms of professional learning?
14. How often do you set or discuss goals for collaboration with colleagues, coaches, or administrators?
15. How often do you discuss evaluation scores?
16. How often do you review student assessment data to make instructional decisions?
17. How often do you co-teach?
18. How often do you observe one another's classrooms to get ideas for instruction?
19. How often do you observe one another's classrooms to offer feedback?
20. How often do you plan a lesson together?
21. How often do you provide or receive feedback about instructional practices and activities?
22. How often do you work collaboratively to develop or modify materials or activities for particular classes?
23. How often do you meet with an instructional coach?
24. How often do you participate in professional development sessions or workshops?
25. How often do you engage in lesson study or lesson rehearsal groups?
26. How often do you participate in professional learning communities?
27. How positive is the tone that school leaders set for the culture of the school?
28. For your school leaders, how important is teacher satisfaction?

29. Overall, how positive is the influence of the school leaders on the quality of your teaching?
30. How effectively do school leaders communicate important information to teachers?
31. How knowledgeable are your school leaders about what is going on in teachers' classrooms?
32. How responsive are school leaders to your feedback?
33. How effective are the school leaders at developing rules for students that facilitate their learning?
34. How clearly do your school leaders identify their goals for teachers?
35. When the school makes important decisions, how much input do teachers have?

Appendix B

Student Survey Questions

1. How excited are you about going to your classes?
2. How interesting do you find the things you learn in your classes?
3. How useful do you think school will be in your future?
4. In your classes, how excited (“eager” in the 6-8 version) are you to participate?
5. How important is it to you to do well in your classes?
6. How focused are you on the activities in your classes? (3-5)
7. How often do you get so focused on activities in your classes that you lose track of time? (6-12)
8. How much do you see yourself as someone who appreciates school? (6-8)
9. How often do you use ideas from school in your daily life?
10. When you are not in school, how often do you talk about ideas from your classes? (3-5)
11. How interested are you in your classes?
12. How well do people at your school understand you as a person?
13. How connected do you feel to the adults at your school?
14. How much do you matter to others at this school?
15. Overall, how much do you feel like you belong at your school?

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