Feedback: An Exploratory Case Study Examining Administrative Expertise on Intermediate Mathematical Pedagogy

by

Jennifer Frances Livornese

Dissertation Submitted to the Doctoral Program

of the American College of Education

in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

March 2021

Feedback: An Exploratory Case Study Examining Administrative Expertise on Intermediate Mathematical Pedagogy

by

Jennifer Frances Livornese

Approved by:

Dissertation Chair: Dr. Michelle McCraney, Ed.D.

Committee Member: Dr. Susan Spero, Ed.D.

Abstract

Literature has focused on the need for middle and high school leaders to extend relevant feedback to mathematics teachers. Further research filled a gap in research by exploring perceptions of the feedback given to elementary mathematics teachers. Theoretical foundations of the study integrated leadership and constructivist theories to investigate the phenomenon. The research questions explored the relevance of feedback received from school leaders and teacher perception of school leader mathematics expertise. The purpose of the qualitative exploratory case study was to investigate teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in intermediate mathematics in Florida. The problem was the scope and relevance of content-based feedback delivered by school leaders to intermediate mathematics teachers in elementary schools did not provide adequate means for improved teacher pedagogy. The population was a purposively selected sample of 13 teachers and three school leaders who experienced mathematics feedback as the giver or receiver. Data were collected using virtual and face-to-face semi-structured interviews and electronic open- and closed-ended questionnaires. Data analysis utilized an inductive approach, assigning labels to phrases, sentences, or paragraphs in a descriptive or summative manner. Three themes emerged from the investigation: the influence of feedback in mathematics on classroom instruction, the difference content expertise makes in the relevance of feedback, and the relationship between building capacity in a content area and instructional leadership practices. Results indicated school leaders and teachers benefit from the study through deeper understanding of how content expertise can tailor feedback to improve elementary mathematical pedagogy.

Dedication

The dissertation is dedicated to my family, who have been an unending source of support and encouragement, not only through the dissertation journey, but throughout my life. My parents immigrated to the United States and found true value in education and pursuing success. They have instilled the same sense of core values and perseverance in my spirit, and I am forever grateful for the resources they have provided, so I can be successful. My son, Patrick, and my daughter, Mackenzie, have been endless in their support of my continuing education and have never stopped telling me how proud they are of their mom. As I watched them grow into adults, I am proud to recognize the same core values and beliefs, power in truth, question of status quo, significance of education, and independent thinking my parents instilled in me. The dissertation is also dedicated to all of the educational leaders, teacher leaders, classroom teachers, and school staff who work diligently and conscientiously to ensure students receive equitable opportunities to pursue their dreams and become successful contributing members of the greater society.

Acknowledgements

I would like to thank God for blessing me with the foresight, knowledge, passion, grit, and perseverance to complete my research and dissertation journey with success.

I would like to express my deepest and sincere gratitude to my dissertation chair, Dr. Michelle McCraney, for guiding and encouraging me through the research process and providing invaluable insight and information throughout the dissertation journey. I am grateful for my committee member, Dr. Susan Spero, and her encouragement to help me continue, carry out, and succeed with my research project. I would also like to express sincere thanks to my teachers of record, Dr. Everts, Dr. Maranga, Dr. Akin, and Dr. Reichard for their encouragement, wisdom, and guidance for helping me successfully complete each chapter of my dissertation.

I am extremely grateful to the school district leaders, elementary school leaders, and teacher participants for their willingness, enthusiasm, and aptitude to participate in research during such unprecedented times.

I would be remiss if I did not formally thank my parents and my children who loved, encouraged, and supported me every step of the advanced degree process; who put up with my frustrations, long nights of dedicated work, and sacrifice to complete my final project; and kept everything positive. A special thanks goes to one of the best friends I am blessed to have, Mrs. Velvet Caldwell. Without her prayers, love, encouragement, and unending support, I may have neglected to begin or complete the doctoral journey. Lastly, to Katie Shaw and Brian Plush, two of the greatest people I know. I am so grateful to have met you both during the first milestone of the dissertation journey and extremely lucky our peer support ended up becoming lifelong friendship. In omnia paratus.

Table of Contents

LIST OF TABLES

Table

LIST OF FIGURES

Figure

Chapter 1: Introduction

School leaders are considered an essential for the accomplishments and maintenance of school infrastructure, including the measure of teacher proficiency in content areas (Neumerski et al., 2018). School leaders are likewise expected to be instructional leaders (Neumerski et al., 2018). Instructional leadership has been deeply entrenched in model frameworks and transcends the expectations for producing exemplar school leaders (Neumerski et al., 2018). Supplementary to maintaining the day-to-day functionality of school environments, school leaders are compelled to discover different ways to engage instructors in practical applications of improved pedagogy (Ghavifekr, Radwan, & Velarde, 2019). New dynamics of teacher evaluation and feedback systems have promoted synergistic interactions between the school leader and the classroom teacher (Ghavifekr et al., 2019).

Required procedures for providing summative feedback to improve teacher pedagogy have extended the procurement of distinct curriculum knowledge (Mireles-Rios & Becchio, 2018). Research indicates school leader extension of relevant content-area feedback to teachers has increased teacher self-efficacy and improved student learning (Lochmiller, 2016; Mireles-Rios & Becchio, 2018). School leaders are at the forefront of professional learning in schools, including how teachers grow and develop from performance feedback (Rigby et al., 2017). School leaders who amassed mathematical knowledge to significantly influence teacher delivery of content and student acquisition of concepts were noted as instructionally consummate (Lochmiller, 2016; Mireles-Rios & Becchio, 2018). The perceptions of teachers who experienced an instructional leader as conversant in content areas were more favorable than teachers who perceived school leaders had minimal curriculum expertise (Neumerski et al., 2018; Rigby et al., 2017).

Background of the Study

Federal mandates through the Every Student Succeeds Act (ESSA) emphasized state leaders had the educational accountability to procure the improved performance of school leaders, teachers, and student performance (Chenoweth, 2016; Elgart, 2016; U.S. Department of Education [USDE], 2016). Improved instructional leadership in schools throughout the United States ranked high on the list of priorities for school reform (USDE, 2016). The ESSA provided school leaders a fresh perspective on how to disseminate information to teachers, contribute to professional learning, and decrease the achievement gap (Chenoweth, 2016; Elgart, 2016). The new standards for school accountability allowed state, district, and school leaders to strategically reexamine opportunities for schools to promote continuous improvement and processes for transforming school leaders into proficient instructional leaders (Chenoweth, 2016; Elgart, 2016). One of the greatest indications of strong instructional leadership rests on the teacher perception of curriculum knowledge school leaders possess (Rigby et al., 2017).

A study conducted by members of the Wallace Foundation (2016) revealed school leaders play a crucial role in developing a fellowship of instructionally savvy instructors who cultivate and enhance pedagogy. Implied was the requirement for school leaders to be able to proliferate content knowledge to effectively distribute skills and structure of the different curricula. One method school leaders use to demonstrate expert content knowledge is actively engaging teachers in continuous and relevant cycles of performance feedback (Rigby et al., 2017). Addedly, high-quality, content-based feedback impacts teacher implementation and student practice of mathematics (Rigby et al., 2017). Instructional leaders who issue specific performance feedback in mathematics engage teachers in building capacity and competence to construct pedagogical skills (Lochmiller, 2016; Rigby et al., 2017).

Statement of the Problem

The problem was the scope and relevance of content-based feedback delivered by school leaders to intermediate mathematics teachers in elementary schools did not provide adequate means for improved teacher pedagogy (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Previous research stressed the importance for school leaders to provide authentic, valuable, and knowledge-based feedback to teachers through continuous performance evaluation (Lochmiller, 2016). The literature revealed the school leader mindset often overlooks data and information obtained through the evaluation process to provide teachers with feedback relevant to content areas (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). The phenomenon of failing to provide instructors with enriched content-based feedback demonstrated the need for school leaders to subsume relevant feedback aligned with content areas (Lochmiller, 2016). The problem extended to school leaders and intermediate mathematics teachers who were required to sustain improvement in mathematical pedagogy (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017).

Purpose of the Study

The purpose of the qualitative exploratory case study was to investigate the scope and relevance of teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in intermediate mathematics in Florida. Qualitative research is implemented when the collection of data is dependent on vast perspectives, answers, and reactions from research participants (Creswell & Creswell, 2018). The consideration for commencing an exploratory approach to understand a phenomenon also underscored the processes required of qualitative research (Creswell & Creswell, 2018). Case studies are different from other forms of qualitative

studies by a sheer focus on perspective and the merit of an investigation relating to a group or population (Creswell & Creswell, 2018; Yin, 2018).

Significance of the Study

Feedback delivered by the school leader augmented existing teacher content knowledge (Telio, Regehr, & Ajjawi, 2016). The exemplar of content knowledge and vast pedagogical skills falls on the shoulders of the instructional leaders who are at the helm of modern schools (Lochmiller, 2016). School leaders who deliver feedback irrelevant to a discipline are perceived as lacking the curriculum knowledge to advance teacher pedagogy (Telio et al., 2016). Literature has focused on instructional feedback within the higher education setting or high school education (Donahue & Vogel, 2018; Fernando & Marikar, 2017; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). A gap in the literature pertained to examining how the expertise of elementary school leaders is perceived by teachers of intermediate mathematics.

The qualitative exploratory case study allowed the exploration of participant perspectives of leader expertise and feedback on teacher pedagogy in elementary mathematics. The benefits of the research revealed barriers to school leader provision of exemplar feedback in elementary mathematics and provided valuable insight for improving teacher pedagogy through relevant, expert, content-based feedback. A case study provided access to deep, rich explorations of participant perspectives, ideas, thoughts, and knowledge about school leaders' influence on mathematical pedagogy (Yin, 2018). The research revealed additional perceptions of professional learning, school leader actions, performance evaluations, and how teachers are better supported with learning the mathematics curriculum.

Research Questions

The research questions were devised to prompt various perspectives and to engage study participants in data collection through semi-structured interviews and open- and closed-ended questionnaires centered on mathematical feedback to improve teacher pedagogy. Research questions are important for the full understanding and nature of the phenomenon examined (Creswell & Creswell, 2018). Questions designed to cover specific subject matter supported the accumulation of responses with deep detail and encompassed multiple participant perspectives (Creswell & Creswell, 2018). The following research questions guided the qualitative exploratory case study:

Research Question 1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?

Research Question 2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?

Theoretical Framework

The theoretical framework for the research study was grounded in constructivist and transformational leadership theories (Bass, 1985; Burns, 1978; Dewey, 1986; Piaget, 1953; Vygotsky, 1978). School leaders ought to have curriculum knowledge which allows teachers to construct new meaning from performance feedback (Donahue & Vogel, 2018; Fernando & Marikar, 2017). Instructional leaders endeavor to build capacity in teachers and work within the performance process to improve teacher pedagogy (Mireles-Rios & Becchio, 2018). Theories of constructivism and leadership emphasized the school leader's role in developing or constructing

teacher efficacy for better acquisition of skill sets used in pedagogical delivery (Fernando & Marikar, 2017).

In elementary school, intermediate mathematics is defined by the need for school leaders to effectively deliver feedback, which reinforces mathematical content knowledge. Leadership and constructivist theories can expose the interpretation for school leaders to transcend instructional leadership by manifesting sustainable and improved mathematical pedagogy through administrative expertise. The two theories converged to support the integration of instructional leadership with relevant feedback in the mathematical content area (Fernando & Marikar, 2017).

Definitions of Terms

The following terms are defined for the investigation. Definitions of the terms are provided to elucidate the reference and relevance of the terms throughout the manuscript. The identified words and short phrases enhance the understanding and meaning of the subject matter of the study. Each definition was secured to the work with supplementary references and descriptions.

Content Expertise. The concepts, understanding, strategies, and dominant structure of curricula necessary for teaching intermediate elementary mathematics (Lochmiller, 2016; Rigby et al., 2017).

Feedback. The practice of providing quality information to address the quality of instruction and enhance teacher skills in content areas, classroom management, and professional learning (Mireles-Rios & Becchio, 2018).

Instructional Leadership. The application of leadership skills and endeavors used by school leaders to improve teacher pedagogy and the academic achievement of students (Donahue & Vogel, 2018; Fernando & Marikar, 2017).

Pedagogy. The techniques and exercises of teaching, specifically as an educational subject or theoretical concept (Plaatjies, 2019).

Performance/Teacher Evaluation. The complex process employed by school leaders usually requiring a cycle of conferencing, observation, data collection, feedback, and a report (Mireles-Rios & Becchio, 2018; Rigby et al., 2017).

School Leaders. The leaders of a school; the exemplar models. A school leader group can be comprised of the principal, assistant principal, and mathematics coach/resource teacher responsible for designating quality professional learning and education are available to instructors and students (Mireles-Rios & Becchio, 2018; Rigby et al., 2017).

Transformational Leadership. A style of leadership focused on benefiting both leaders and members of the workforce through a mutual and complementary relationship (Bass, 1985; Burns, 1978).

Assumptions

Assumptions related to the study represented information accepted to be true (Creswell & Creswell, 2018; Wolgemuth, Hicks, & Agosto, 2017). The underlying assumptions for the study were feedback offered to intermediate mathematical teachers was provided by school leaders who were well versed in mathematical content and school leader feedback played a significant role in enhancing the pedagogical practices of intermediate mathematics teachers. Assumptions encompassed the latitude of school leader expertise recognized by teachers when content-based

feedback in mathematics is delivered in conjunction with the understood and unequivocal perception of school leader expertise in mathematics.

The participants were assumed to answer the interview and questionnaires truthfully and with reliability. Participant honesty and forthrightness are integral for data collected during qualitative research to be substantial and noteworthy (Creswell & Creswell, 2018). The theoretical framework grounded the study in leadership theory and constructivist theory. The assumption was participants constructed new information from previous experiences, maximized feedback contribution, and influenced educational practices. Consideration needed to be given to the assumption personal experiences influenced the primary investigator's ability to conduct objective research. Because qualitative research requires the interpretation of data, unbiased behavior is essential to the success of the study (Creswell & Creswell, 2018).

Scope and Delimitations

Delimitations are the limitations set to serve as the scope and boundaries for containing the study within the reach of the aims and objectives of the investigation (Theofanidis & Fountouki, 2018). The scope of the study was 13 teachers and three school leaders who taught intermediate mathematics or provided feedback for intermediate teachers of mathematics. Participants were selected based on voluntary participation and informed consent. The focus of the study was to gain insight into the perspectives of intermediate math teachers on the influence of administrative expertise on mathematical pedagogy. The site for the research was selected due to work location, familiarity, and proximity to the primary investigator.

Due to school district directives, research occurred from the last week of September 2020 through October 2020 and was contained to one suburban elementary school. The theoretical framework limited the concentration of the study to examine the perspectives of teachers

regarding administrative expertise through a lens framing the construct of intermediate mathematical knowledge from school leader feedback. A qualitative exploratory case study was selected because the aim was to collect data representing diverse perspectives from participants with an exploratory approach to understanding the phenomenon (Creswell & Creswell, 2018). The focus of the case study was intermediate mathematics teachers and the school leaders who provide feedback (Creswell & Creswell, 2018; Yin, 2018). Due to the specificity of participants, school leaders, and limits to elementary education in intermediate mathematics, the results of the study were not generalizable to an entire population of teachers or school leaders.

Limitations

Qualitative case studies are usually limited by the incapability to generalize to the wider population, researcher participation and bias, and the time needed to complete the research (Creswell & Creswell, 2018). Limitations were defined to reduce bias within the data collection (Theofanidis & Fountouki, 2018). A few limitations apply to the investigation. The study was limited to the number of teachers in intermediate grades (Grades 3–5) and the school leaders in one elementary school who chose to participate in the research. Teachers likely receive various forms of feedback from different sources in different content areas. The study was limited to feedback received in mathematics from school leader sources, including only the principal, assistant principal, and math coach. Framing the study in a suburban section of one school district with a small participant pool prevented the findings from being generalized to the larger population of school districts with a different structure or organization.

The timing of the research was influenced by the window of time the school district permitted research to occur during the fall semester. As the study was conducted at the beginning of the school year, perspectives of teachers who have not been subjected to a performance

evaluation or first-time math teachers were possibly impacted. Interviews were limited to after work hours, which could have impacted the inclination of some teachers to participate in the study.

Data were gathered for the investigation through semi-structured interviews and questionnaires. Data collected were strictly dependent on the sincerity of the participants (Creswell & Creswell, 2018). The perspectives and experiences of the interviewees were limited to the questions asked by the interviewer (Yin, 2016). Perceptual information obtained through interviews was noted to be connected to participant bias (Creswell &Creswell, 2018; Yin, 2016). Triangulation of the data assisted in ruling out biases and contributed to the accuracy of data gathered to support the research.

Chapter Summary

An overview and introduction to the essential role of school leaders concerning math education and relevant performance feedback were provided. The problem of the study was identified and connected to the role and expertise of the school leader and acquisition of mathematical knowledge constructing pedagogy from feedback (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). The purpose of the qualitative exploratory case study was to investigate the scope and relevance of teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in intermediate mathematics in Florida. The significance of the research was furthered through the consideration of teacher perspectives on how administrator expertise influences pedagogical skills in intermediate mathematics. Research questions and definitions of key terms were provided. Assumptions, delimitations, and limitations were addressed and defined. The following sections outline the theoretical framework

and the review of literature apropos to the professional nature of the school leader and school leader expertise in intermediate mathematics.

Chapter 2: Literature Review

School leader feedback following teacher performance evaluations is frequently vague, and leaders often neglect to nurture continual growth and improvement of teacher instruction in a content area (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). The problem was the scope and relevance of content-based feedback delivered by school leaders to intermediate mathematics teachers in elementary schools do not provide adequate means for improved teacher pedagogy (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). Feedback delivered to teachers of mathematics has been noted as universal and incongruent to pedagogy and pedagogical skills, which does not allow teachers to deliver necessary and rigorous instruction to students (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). The purpose of the qualitative exploratory case study was to investigate the scope and relevance of teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in intermediate mathematics in Florida.

Student understanding and application of mathematics concepts have the potential to make a significant impact on domestic and global economies. From the early years of U.S. elementary education through higher learning, mathematics has been widely considered an area of focus. To increase the rigor of mathematics education in schools, federal and state regulations require increased thoroughness of mathematics standards determined to help students succeed in mathematics classes (USDE, 2019). School leaders are held accountable to ensure teachers of mathematics employ relevant strategies and skills which increase student knowledge of mathematical concepts and abstract thinking. The following sections are provided: literature search strategy, theoretical framework, research literature review, and summary. A review of the literature indicated further research was necessary to explore how leader style and performance

feedback from school leaders in intermediate mathematics are perceived by school leaders and teachers.

Literature Search Strategy

The literature search began with the identification of empirical terms relevant to the research topic. The search for peer-reviewed articles was conducted through the American College of Education online library and open-access applications. Several databases used for discovery are Academic Search Complete, EBSCO, ERIC, JSTOR, Google Scholar, ProQuest, and *Sage Journals*.

The following key terms and phrases were utilized alone and in combination to access information pertinent to the study: *educational leaders*, *leadership skills*, *leadership styles*, *transformational leadership*, *instructional leadership*, *feedback*, *feedback in the workplace*, *feedback in education*, *pedagogy*, *mathematical pedagogy*, *mathematics education*, *feedback in mathematics education*, *feedback in intermediate classrooms*, *feedback in intermediate mathematics classrooms*, *constructivism*, *constructivist theory*, *content expertise*, and *school administrator expertise*. Boolean operators "not" and "or" were used to locate relevant articles. References within the articles were used to uncover other literature related to the dissertation topic. All articles were placed in the American College of Education thematic grid and a database for upkeep and review.

Theoretical Framework

The theoretical framework for the research study was grounded in constructivist (Dewey, 1986; Piaget, 1953; Vygotsky, 1978) and transformational leadership theories (Bass, 1985; Burns, 1978). Researchers stipulate, to improve instructional pedagogy, school leaders need to sustain the aptitude and mathematical skills to deliver evocative and suitable feedback to

intermediate mathematics teachers (Donahue & Vogel, 2018; Fernando & Marikar, 2017; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). Principals who operate as instructional leaders transform pedagogy with relevant feedback in a content area (Lochmiller, 2016). Amalgamating theories of leadership and constructivism with school leader acquisition of content knowledge reinforced the necessity to study the need for school leaders to effectively deliver feedback in intermediate mathematics (Fernando & Marikar, 2017; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). When school leaders manifest expertise and feedback in specific content areas, teachers are granted opportunities to construct new knowledge for sustainable and improved pedagogy (Lochmiller, 2016).

The superimposed set of theories supported the exploratory integration of instructional leadership with relevant feedback in the mathematical content area (Fernando & Marikar, 2017). The study asserted instructional leadership integrates one element of transformational leadership theory, individualized consideration, with the constructivist approach of how teachers build mathematical pedagogy from administrative feedback (Burns, 1978; Dewey, 1986; Piaget, 1953; Vygotsky, 1978). Constructivism, as epistemology, is principally defined by experiential learning or learning from constructing information (Dewey, 1986; Fernando & Marikar, 2017).

Constructivism

Constructivism is a popular learning theory for addressing different ways of teaching and learning through experiences with content (Dewey, 1986; Piaget, 1953; Vygotsky, 1978). The philosophical underpinning of constructivism was epistemology, a division of philosophy, which studies the nature and acquisition of knowledge (Dewey, 1986; Piaget, 1953; Vygotsky, 1978). Construction of knowledge through experiences or events occurs through the active process of acquiring knowledge (Dewey, 1986). The theoretical framework for the study integrated

Dewey's (1933) theory of constructivism with leadership expertise, evaluative feedback, and mathematics pedagogy. To understand how Dewey's theory was understood as constructivist and how the theory is applied to the adult acquisition of content knowledge, the origins of constructivism through the lenses of Piaget and Vygotsky are discussed as follows.

Cognitive constructivism. Piaget assumed motivation for learning is established through a desire for persons to maintain a balanced state of knowledge (Clark, 2018; Ivie, 2017). When new information is introduced, possibly causing imbalance or uncertainty of learning, individuals adapt or modify the information to restore balance (Piaget, 1953). The novel information, which causes an imbalance in learner knowledge, is foundational to the deeper and more complex understanding of content (Piaget, 1953). Individuals modify or adapt new information to make sense, restructure, deepen knowledge, or flip perspective on a discipline (Ivie, 2017; Piaget, 1953).

Piaget's theory of cognitive development significantly emphasized the position of prior knowledge in the knowledge-building process (Ivie, 2017). Individual construction of knowledge merges cognitive development with constructivism and the notion learning is not an automatic process. Most noted are the implications Piaget's theory had for instruction, which impacts teacher pedagogy and classroom environment (Clark, 2018; Ivie, 2017). Students are considered a reservoir of knowledge with preceding experiences often gathered from life outside of the school building (Piaget, 1953). Simply, educators have the responsibility to view students as more than faces in the classroom and should employ instruction to enliven and enrich the lives of the students with new understandings (Piaget, 1953). Presenting information in a non-stimulating way would only serve to ignore prior knowledge and does not acknowledge the learner as an active participant. Vygotsky's addendum to constructivism comprises how persons acquire new

information with the incorporation of the roles of culture, language, and social interaction (Eun, 2019).

Social constructivism. Vygotsky believed learning is a developmental process, but he explicated what is realized as a difference between the learning of spontaneous concepts and scientific concepts (Clark, 2018; Eun, 2019). Spontaneous concepts are developed by children through everyday activities and life experiences (Vygotsky, 1978). Scientific concepts arise from the construction of new knowledge developed through facilitated learning (Vygotsky, 1978). Vygotsky noted individuals would not be able to singularly understand or acquire scientific concepts without assistance from an adult, primarily in the form of an instructor (Clark, 2018; Eun, 2019). Learners could deepen and advance knowledge of a skill or concept with the help of an experienced adult (Vygotsky, 1978). Vygotsky's approach to framing constructivism encompassed the notion of collaboration or cooperation as beneficial to retrieve information to complete a learning task (Eun, 2019).

Scholars who cooperate through a progressive learning task demonstrate higher work effort than singular performance measures (Vygotsky, 1978). Vygotsky referred to cooperation and collaboration as the dialogical nature of learning (Clark, 2018). Related to education, the dialogical nature of learning has been widely referred to as informational or instructional scaffolding (Clark, 2018; Eun, 2019; Vygotsky, 1978). Scaffolding content is a technique of presenting material, so learners can acquire and manifest information in segments. Scaffolding can deepen professional procurement of knowledge through collaborative professional activities, such as when teachers receive content-area feedback on performance evaluations.

Vygotsky's theory of social constructivism supports the process adults find most beneficial for supporting the acquisition of new knowledge (Clark, 2018; Eun, 2019).

Vygotsky's take on constructivist principles refined cognitive development into zones he defined as the zone of proximal development (Eun, 2019). Teachers who receive feedback from school leaders can connect to the zone of proximal development with interrelated concrete development of content and pedagogy and the balance of perceived skill development through adult collaboration and facilitation. The process teachers employ to build skills in content and pedagogy can be encouraged through experience and cooperation with school leaders. Complete interactions between the feedback receiver and feedback giver, or teacher and school leader, can only be represented if the receiver is surrounded by suitable instructional conditions (Vygotsky, 1978).

The process of scaffolding feedback for a content area through leader expertise can allow educators to receive information to benefit pedagogical development. Experiential exercises are often noted as a way to develop knowledge through constructing skillsets from participatory contributions (Dewey, 1986). For school leaders to deliver meaningful and content-based feedback, expert knowledge must be concise and built through the experiences of leaders in various settings (Ali, 2017; Altan, Lane, & Dottin, 2019). The participatory contributions of school leader knowledge should stem from leader realization of content expertise, building scaffolded platforms teachers can use to improve pedagogical skills in the subject areas (Lochmiller, 2016). At times, expertise requires the school leader to veer from the traditional landscape of how feedback is delivered and consider a more progressive approach.

Dewey and constructivism. Dewey has been long recognized for his progressive work with reforms in social justice, democracy, and promoting student acquisition of knowledge to promote productive citizenship. In addition to philosophical theories, Dewey was also known for his perspectives on educational reform and educational theories (Altan et al., 2019; Clark, 2018).

Traditional education was criticized for permitting individuals to be passive learners (Dewey, 1986). The purpose of education is not the rote memorization of skillsets but the building or constructing of knowledge through experiential exercise (Dewey, 1986).

In progressive education, individuals took an active and experiential role in the learning process (Clark, 2018; Dewey, 1986). Learners had the right to fulfill their academic potential with the application of information and skills of real-world problem solving (Altan et al., 2019; Dewey, 1986). Information acquired through the experiential learning process was part of the individual's understanding of building and organizing knowledge (Altan et al., 2019; Dewey, 1986). The instructor is the facilitator of the learning environment, guiding learners to use physical action and mental astuteness to obtain contextual and conceptual information (Dewey, 1933).

Education can be viewed as a process whereby individuals differentiate and scaffold learning through experience (Vygotsky, 1978). Subsequent learning experiences can result in the transfer of information from one educational environment to the application of new knowledge and skills in another setting (Altan et al., 2019; Clark, 2018). Didactic interactions between individuals can manifest reconstructed thinking of a certain concept or skill (Dewey, 1986). School leaders can consider the application of constructivism to grow and facilitate teacher learning of the dominant structure and content of a discipline. The study examined school leader and teacher perceptions of intermediate mathematical feedback as a way of discovering how leader expertise constructs a framework of teacher content knowledge and definitive leadership.

Just as constructivism can provide educators with a framework for incorporating rigorous and dialogical learning with students, school leaders can apply the theory to content learning within evaluative feedback. Analogous to young learners, adults necessitate the foundation of

developmentally apposite instruction (Fernando & Marikar, 2017; Walter, 2019); while the statement evokes a more contemporary view on constructivist theories, adult presentation and processing of information needs professional facilitation from an effective and expert leader (Fernando & Marikar, 2017). For school leaders to apply the constructs of constructivist theory in evaluation and feedback, leader practices should closely align with the mannerisms extended by a transformational leader.

Transformational Leadership Theory

Transformational leadership was introduced as a theory by James Burns (1978). Transformational leaders are defined as individuals who achieve high ideals of leadership through collaboration, measures of change, and inspiration of the workforce (Burns, 1978). The adaptive nature of transformational leaders has the unique ability to work with various members and departments in the workforce (Burns, 1978). Bass (1985) later extended the transformational leadership theory to the four I's of transformational leadership: inspirational motivation, idealized influence, intellectual stimulation, and individualized consideration (Bass, 1985). ~~L~~eaders who align transformational leadership theory in practice often work to enhance the core values and motivations of the staff by practicing the four behaviors (Bass, 1985).Transformational leaders must have the ability to facilitate how the workforce mobilizes, accepts, and develops self-efficacy (Bass, 1985; Burns, 1978). The four I's of transformational leadership are adjunct to the original theory of transformational leadership and are a means to measure the effectiveness of transformational leaders (Bass, 1985). The focus of the investigation was framed around the theories of constructivism and Bass's (1985) four I's of transformational leadership. Each of the four I's of transformational leadership closely aligns

with the role of school leader expertise and instructional leadership, performance evaluation, and relevant content-area feedback. Figure 1 illustrates the four I's of transformational leadership.

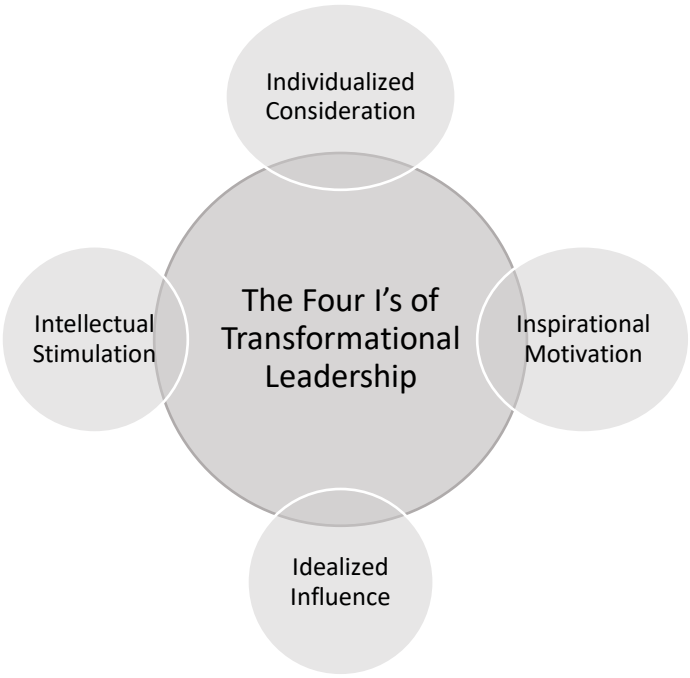


Figure 1. Four I's of transformational leadership.

Inspirational motivation refers to the charisma of a transformational leader and the ability of the leader to motivate the workforce (Bass, 1985). School leaders should be able to stimulate school staff to consider the engagement of curriculum and pedagogy markedly and reflectively as it pertains to student achievement (Ali, 2017; Altan et al., 2019). *Idealized influence* refers to how the leader relates to the workforce and subsists in the role of mentorship and positive role model (Bass, 1985). Measures can consist of how school leaders build the collective identity of the staff to inspire relevance and enthusiasm for the execution of higher performance standards and pedagogical improvement.

Intellectual stimulation is the process whereby leaders strive to push employees or to achieve goals and challenge staff to meet and surpass organizational challenges (Bass, 1985).

Related to constructivism, intellectual stimulation can consist of the vast ways school leaders provide feedback to staff and the way teachers construct new knowledge from administrator facilitation and expertise. Lastly, *individualized consideration* means transformational leaders validate operative essentials by expressing concern for individual and group needs while developing leadership potential (Bass, 1985). Feedback related to performance evaluation can be challenging for school leaders and teachers (Fernando & Marikar, 2017). Teacher perception of school leader expertise following a performance evaluation can depend largely on the feedback received from the school administrator. Individualized consideration can be used as a measure of how well school leaders provide knowledgeable feedback in content areas and how the feedback is tailored to the individual needs of the teacher.

The evolution of expertise, which shapes leader context and the alacrity of the leader to be an involved contributor to instructional practice, is tantamount to constructing curriculum knowledge (Fernando & Marikar, 2017). Constructivist theorists asserted individuals formulate new learning or construct new information through exchanges of beliefs and ideas, differentiated events, social opportunities, and experiential activities (Dewey, 1986; Piaget, 1953; Vygotsky, 1978). The four I's of Bass's (1985) transformational leadership theory proposed a measure to assess leadership capabilities and the attributes which indicate effectual leadership. Integrated as a framework, both theories provide opportunities for school leaders to build pedagogical knowledge through valid and relevant evaluative feedback.

Depending on leader expertise, evaluative feedback can be perceived as encouraging teachers to interpret or construct new knowledge or ideologies about mathematics education in the intermediate classroom (Fernando & Marikar, 2017; Ingersoll, Sirinides, & Dougherty, 2018; Lochmiller, 2016; Sebastian, Allensworth, & Huang, 2016). School leaders are directly

responsible for observing and providing feedback to various school personnel (Ingersoll et al., 2018; Vogel, 2018). Gone are the days for perfunctory feedback from school leaders (Fernando & Marikar, 2017; Ingersoll et al., 2018; Lochmiller, 2016; Sebastian et al., 2016). In addition to transformational leaders, teachers need strong instructional school leaders who are content experts and may advance teacher knowledge of content (Sebastian et al., 2016; Vogel, 2018). Considering the implications of the four I's of transformational leadership and constructivism, school leaders should diligently focus on developing deeper teacher content knowledge through assimilation of the instructional leadership model.

Research Literature Review

Leadership has many aspects important to advancing distinct methods of productivity in the workforce (Benoliel & Schechter, 2017). Leaders who engage in action from the workforce tend to move staff forward and inspire innovative processes (Benoliel & Schechter, 2017). Especially in education, leaders have the potential to illuminate and designate the professional skills necessary for pedagogical success. The connectedness between a successful school leader and the acceleration of pedagogical skills can be inherently aligned with leadership style and leader habits (Benoliel & Schechter, 2017; Rigby et al., 2017). The following research literature review unites the theoretical framework with leadership style and leader possession of mathematical content knowledge to elucidate the scholarly perspectives of intermediate mathematics instruction in schools.

The Context of School Leadership

School leadership style continues to be a highly debated and explored construct among educational experts (Cogaltay, Yalcin, & Karadag, 2016). Numerous stakeholders view school leaders as essential to the success of teachers, students, and overall school performance. Held to

the highest expectations, school leaders are responsible for improving teacher performance and increasing student achievement (Fernando & Marikar, 2017; Ingersoll et al., 2018; Lochmiller, 2016; Sebastian et al., 2016). Research indicates school leaders are responsible for improving pedagogical content instruction to increase student accomplishment (Fernando & Marikar, 2017; Ingersoll et al., 2018; Lochmiller, 2016; Sebastian et al., 2016). School leaders are tasked with mastering all means of professional proficiencies and exhibiting leader behaviors and skills which transpose to the staff and define the school (Lochmiller, 2016). School leadership has been noted as second to classroom instruction, suggesting school leaders should present staff with competent knowledge and the ability to communicate information about various content areas (Cogaltay et al., 2016; Fernando & Marikar, 2017; Ingersoll et al., 2018; Lochmiller, 2016; Sebastian et al., 2016).

Successful school leadership has been documented to promote positive change in schools (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018). Effective educational leaders are better able to manage and build relationships with staff, shape successful school vision and mission statements, use standards and assessments to guide instruction, apply different methods of evaluation and feedback, identify areas of support, and communicate effectively to promote improved pedagogical practice (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018). Speculation about different types of leadership has dominated the literature and emphasizes how educational leaders effectively manage, implement, and influence everything from teacher pedagogy to acceptance of performance feedback (Bellibas & Liu, 2017; Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018). School leaders typically are segregated into two major leadership categories: transformational or instructional leadership (Ismail, Don, Husin, & Khalid, 2018). Literature regarding the school leader style indicates the application of either

transformational or instructional leadership as best practice in a school setting (Bellibas & Liu, 2017; Cogaltay et al., 2016; Ismail et al., 2018).

Transformational School Leadership

Transformational leadership was first recognized in the literature in the 1970s as a best leader practice (Boberg & Bourgeois, 2016). Compared to other types of leader styles—situational, trait, and transactional—transformational leadership emerged as best overall practice, epitomized by various educational leaders (Marques de Lima Rua & Costa Araujo, 2016). Transformational leadership is commonly described as a leadership style employed to motivate the workforce to improve levels of performance based on alignment to organizational goals (D'Innocenzo, Mathieu, & Kukenberger, 2016). The emergence of transformational leadership as a means to shape leader style and actions marked a departure from authoritarian leadership to an emphasis on worker empowerment, professional learning, and delegation of tasks (McCarley, Peters, & Decman, 2016; Mitchell, 2019).

Transformational leaders are noted as being exceptional leaders within various organizations, but especially in educational organizations (D'Innocenzo et al., 2016; Kouzes & Posner, 2016; Marques de Lima Rua & Costa Araujo, 2016; McCarley et al., 2016; Mitchell, 2019). Educational leaders who exhibit characteristics of transformational leaders incorporate the mission and vision of the organization with accomplished or best practices in daily routines (Kouzes & Posner, 2016; McCarley et al., 2016; Mitchell, 2019). As a result of the transformational leadership style, educational leaders began transforming the norms for how schools were governed (Kouzes & Posner, 2016; McCarley et al., 2016; Mitchell, 2019).

The principal was no longer seen as the locus of control and singular guide (Mitchell, 2019). In schools with leaders who were described as transformational, staff strove to establish

positive school culture (Mitchell, 2019). Faculties described school leadership as creating a vision of hope, optimism, and room for teacher development (Mitchell, 2019). Principals or school leaders who are transformational leaders are described as knowing when to be supportive, how to participate in professional learning, how to empower workers, and how to inspire abstract or critical thinking about teacher practice (McCarley et al., 2016). Numerous studies found transformational leadership had a significant impact on teacher development, perceptions of leader capability, school culture, and professional learning (D'Innocenzo et al., 2016; Kouzes & Posner, 2016; Marques de Lima Rua & Costa Araujo, 2016; McCarley et al., 2016; Mitchell, 2019).

Teachers who experience transformational leadership claim a process of collegiality and motivation to improve practice (McCarley et al., 2016). A transformational principal or school leader motivates staff to proceed with duties beyond the scope of a regular workday. The inspiration to achieve greatness contributes to the advancement of teaching and learning and helps grow professional learning. The scope of a transformational leader reaches beyond the basic needs of the organization and looks for the potential to engage the full following of all persons involved (Marques de Lima Rua & Costa Araujo, 2016; McCarley et al., 2016; Mitchell, 2019). The role of a transformational leader requires the exhibition of behaviors and practices aligned with best practices and paradigms of educational leadership (McCarley et al., 2016; Mitchell, 2019; Zahed-Babelon, Koutlaei, Moeinikia, & Sharif, 2019). A school leader shift from a transformational leader to an instructional leader can be argued as a seamless process which impacts how teachers work and engage in pedagogical improvement.

Instructional Leadership

An instructional leader is similar to a transformational leader with the additional attributes of promoting elevated and constant academic benchmarks; providing an unbiased, progressive, and relevant evaluation of teacher effectiveness; using substantiated data to inform decisions about instruction; and specifying encouragement for and acknowledgment of educators (Ingersoll et al., 2018). Instructional leadership was first presented as a model for educational leadership in the 1980s (Neumerski et al., 2018). Although a variety of different leadership models exist, instructional leadership has received much attention in the educational research literature and complementary studies (Ghavifekr et al., 2019; Neumerski et al., 2018; Vogel, 2018; Wallin, Newton, Jutras, & Adilman, 2019). Instructional leadership has evolved to employ a shared style of leadership, comprising more than just the principal as the primary school leader (Neumerski et al., 2018; Vogel, 2018).

An effective instructional leadership model notes the principal as the driving force behind leading the staff and serving as an instructional coach, mentor, content expert, and relationship builder (Vogel, 2018; Zahed-Babelon et al., 2019). The instructional leadership model transcends transformational leadership by requiring school leaders to have a focused agenda which greatly improves teaching and learning (Bellibas & Liu, 2017; Neumerski et al., 2018; Vogel, 2018). Instructional leaders are characterized by the complex behaviors of the administrator to establish sustained improved pedagogy (Fernando & Marikar, 2017; Vogel, 2018).

School leaders who concentrate on the nucleus of instruction accelerate the improvement of teacher pedagogy with a focused practice on setting goals, professional development, standards-based trajectories, and performance evaluation (Bellibas & Liu, 2017; Ismail et al., 2018). The instructional leadership model demonstrates the determination of the administrator to

integrate expert knowledge and skills into classroom practices. School leaders who engage in instructional leadership concentrate explicitly on pedagogical feedback and content knowledge (Fernando & Marikar, 2017; Ismail et al., 2018). Multiple analyses and studies of instructional leadership style have perpetuated the argument for school administrators to have an enhanced understanding of the dominant structure of content to improve teacher pedagogy and advance student learning (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018).

To enhance and improve teaching and learning, the thought processes and behaviors of instructional leaders should focus on experiencing the explicit and experiential intricacies of the academics themselves (Fernando & Marikar, 2017; Lochmiller, 2016). Instructional leadership skills are developed to enable school leaders to manage the instructional program with focused attention on improving teacher practice (Ismail et al., 2018). In research, practices commonly associated with instructional leadership emphasize the development of teachers as content experts, collaborative leaders, and active participants in the value-added of performance evaluation (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018). School leaders should have a strong professional understanding of how educator performance and evaluation affects teacher pedagogy.

School Leaders and Instructional Leadership

New accountability measures and state demands have placed school leaders at the center of culpability for student achievement. With federal and state departments of education, district leaders, and school leaders focused on the requirements set forth by the ESSA, teacher practice has been under a litany of focused scrutiny (USDE, 2019). According to the USDE (2019), instructional leadership is at the forefront of school leader success. Without the impetus to develop sound instructional school leaders who can expound on pedagogy, student achievement

may deteriorate (USDE, 2019). Instruction and learning should be existential in the priority and practice of effective school leaders. As a practice, instructional leadership requires school leaders to acquire knowledge of the dominant structure of different curriculum areas (Plaatjies, 2019). School leaders who are devoid of content-area knowledge are not able to better develop teacher knowledge in curricular strategies (Plaatjies, 2019).

A pedagogically oriented approach to school leadership is important for educator advancement (Neumerski et al., 2018; Wallin et al., 2019). Several studies have revealed instructional leadership to be a high-impact factor in teacher retention and student success within schools (Brauckmann, Geibler, Feldhoff, & Pashiardis, 2016; Neumerski et al., 2018; Plaatjies, 2019; Sparks, 2018). School leaders who practiced instructional leadership spent more time developing teacher skills, were dedicated to the fidelity of the evaluation process, and promoted collaboration and discussion about problems within content understanding (Zahed-Babelon et al., 2019). Subsequent research also revealed positive correlations between instructional leadership and student achievement (Ghavifekr et al., 2019; Lochmiller, 2016; Zahed-Babelon et al., 2019).

Instructional leadership style emphasizes school leaders do not exist solely for the benefit of running the school (Sebastian et al., 2016). Administrators should strive to embrace teachers and teacher leaders in varied decision-making and instructional processes (Sebastian et al., 2016). Principal involvement and encouragement of teachers in leadership roles evidence a more positive school culture, which impacts student accomplishment (Sebastian et al., 2016). Schools should be environments which offer engaging, meaningful, and value-added work to students, teachers, and other stakeholders (Sebastian et al., 2016).

The concept of evidence-based practice is not new within the sphere of educational advancement (Neumerski et al., 2018). Research has demonstrated the need for school leaders to

conduct teacher evaluations in a manner better served to enhance teacher efficacy and self-awareness (Mireles-Rios & Becchio, 2018). Even with efforts by administrators to offer relevant feedback in mathematics, researchers noted a gap between the feedback itself and practical application of skills in mathematics pedagogy (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Vogel, 2018). To analyze and elucidate reasons for administrator divergence from explicit feedback in intermediate mathematics content, the context of performance evaluation on teacher practice should be explored.

Performance Evaluation and Feedback

School leader behaviors have a significant impact on what transpires in school settings, especially when considering the pedagogical environment (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Evaluation and feedback practices were iterative until school leaders realized the futility and ineffectiveness of generalized feedback (Rigby et al., 2017). To an extent, performance evaluation and feedback practices provide school leaders with opportunities to practice instructional leadership and demonstrate content expertise for pedagogical improvement (Mireles-Rios & Becchio, 2018). Studies of relationships between school leaders and content-based teacher instruction revealed the interactions which take place during a performance evaluation are largely responsible for cultivating teacher quality (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Feedback as a result of performance evaluation has become recognized as the strength of the evaluation cycle (Mireles-Rios & Becchio, 2018).

Despite the forward progress of advancing teacher pedagogy through school leader expertise and feedback practices, most school leaders are still stuck in a rote cycle of the accorded contract of required evaluation and feedback (Mireles-Rios & Becchio, 2018). When

data are misused to inform feedback, and evaluation is an execution of contract conditions, school leaders can simply be seeking to mark teachers as *proficient* or *unaccomplished* in the effort to fulfill a job requirement. True adherence to the fidelity of performance evaluations permits school leaders to construct and advance teacher knowledge while allowing teachers to reflect and consider how to transform and apply new knowledge into practice (Donahue & Vogel, 2018; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Evaluation systems can enrich teacher development if constructive, active, and content-specific feedback is provided by the school leader (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). The principal and school leaders involved in improved instructional practice are responsible for conveying structured and relevant content information (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Instructional leaders are culpable for providing a repertoire of strategies the teacher can apply in practice (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017).

After conducting 24 interviews with teachers regarding their perceptions of school leaders on performance evaluations, researchers found instructional coaches and school leaders had a profound impact on developing teacher pedagogy through performance feedback (Kraft & Gilmour, 2017). Being an instructional coach arouses the inference school leaders are experts in content areas. In any school setting, the ability of the school leader to acquire knowledge of classroom practices manifests in the actions of the school leader to be an active participant in the content and classrooms (Kraft & Gilmour, 2017). Important to providing an effectual evaluation experience, feedback provided must augment instructional merit by including content-based information (Kraft & Gilmour, 2016, 2017; Reid, 2020).

Instructional Feedback

The performance evaluation process provides school leaders with opportunities for improving staff relationships, instructional feedback, and pedagogy (Mireles-Rios & Becchio, 2018). Interview data from 28 instructors revealed feedback most influenced the way teachers perceived strengths and areas of focus in classroom pedagogy and teacher self-efficacy (Mireles-Rios & Becchio, 2018). Overall, the teachers reported a great shortcoming with school leader practice occurred when administrators failed to deliver feedback connected to the quality of instruction and learning (Mireles-Rios & Becchio, 2018). School leaders can play a significant role in how feedback is perceived and constructed by teachers in the school. The provision of evaluation and feedback should require school leaders to reflect on workforce relationships for effective delivery of performance feedback essential to the curriculum.

Effective Feedback Practice

Expert delivery of feedback should focus on cultivating relationships between the school leader and instructional staff (Bellibas & Liu, 2017). School leaders who take the time to build camaraderie among staff hold the power to cultivate positive school culture and maintain expertise (Bellibas & Liu, 2017). Through the process of relationship building, one can infer school leaders who establish positive relationships with instructional staff can provide feedback in a relevant and meaningful way. School leaders who chose not to foster associations with staff experienced teacher apathy and uninterest in making improvements to instructional pedagogy (Bellibas & Liu, 2017). Teachers stated feedback from a respected and expert administrator, even when the feedback included instructional concerns, was received better and inspired constructive change within the classroom pedagogy (Mireles-Rios & Becchio, 2018).

An investigation regarding feedback revealed persons who are responsible for giving feedback must have established credibility with the person receiving the feedback (Telio et al., 2016). If the receiver does not believe the feedback is relevant to practice, the ramifications apply to all future meetings between the giver and receiver (Telio et al., 2016). Feedback delivery must be maximized to have the most positive impact on the receiver (Telio et al., 2016). Telio et al.'s (2016) findings are synonymous with teacher perspectives of administrators who delivered feedback not relevant to specific content knowledge or classroom practices. Especially important is for school leaders to be the exemplar of content and knowledge, providing relevant feedback for effective content practices in the classroom (Donahue & Vogel, 2018; Lochmiller, 2016; Rigby et al., 2017).

Feedback in Teacher Practice

The literature has focused on identifying and implementing school reform to improve instructional practice (Donahue & Vogel, 2018). Teachers benefited from specific and content-based feedback during discussions related to performance evaluations (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Vogel, 2018). For improved pedagogy, the focus for instructional leader practices should be on teacher evaluation, feedback, and classroom practice. When school leaders do not take the time to adequately address relevant content and instructional practices in feedback, frustration can occur, producing discontentment with the methods governing the performance evaluation (Donahue & Vogel, 2018). School leader evaluation practices and content expertise need to be streamlined and adjusted to best deliver operational feedback to teachers (Donahue & Vogel, 2018).

A myriad of teachers perceive feedback as a purpose to alter instructional practice (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018). The quality of

feedback matters and can be the base for how teachers begin to construct meaning from school leader expertise. An investigation of evaluative feedback on pedagogy noted timeliness as well as oral and written communication of the feedback influenced how teachers viewed the means to implement changes to instructional pedagogy (Donahue & Vogel, 2018). Teachers who participated in the study distinguished the desire to receive feedback directly related to content and designed to improve instructional practice (Donahue & Vogel, 2018).

Relevant performance feedback challenges teachers to modify pedagogy and allows teachers to construct information to develop skills aligned with improved classroom pedagogy (Donahue & Vogel, 2018). Teachers noted face-to-face conversations were best supplemented with detailed evidence and decisions about how to pursue the development of skills (Donahue & Vogel, 2018). Not all teachers felt the school leader sufficiently adhered to expert practices with the evaluation and feedback cycles (Donahue & Vogel, 2018). Teachers expressed disappointment with school leaders who did not follow through with fidelity checks to see if new information was being utilized (Donahue & Vogel, 2018). With deference to teacher opinion, the argument for instructional leadership can be presented as part of the move to focus on improved pedagogy through content-concise and expert-based feedback.

The primary focus of instructional leaders has been the pedagogical development of the teaching staff to improve student achievement (Vogel, 2018). Instructional feedback designed to improve teacher pedagogy should be delivered as an unremitting and cyclical progression (Lochmiller, 2016; Mireles-Rios & Becchio, 2018). School leaders as instructional leaders are the individuals who define the importance of altered methods and the manner in which feedback is provided to instructional staff (Mireles-Rios & Becchio, 2018; Vogel, 2018). Feedback which targeted instructional strategies to enhance teacher practice was exact, naming the skills and

structure related to the content discipline (Mireles-Rios & Becchio, 2018). The processes of feedback coupled with a successful performance evaluation can be considered important to measuring how teachers perceive and construct new pedagogy through instructional leadership and school leader expertise. School leader actions are significant for what transpires in classrooms (Rigby et al., 2017).

The implications of irrelevant content-area feedback are especially hard-felt by teachers in the content of intermediate mathematics instruction (Lochmiller, 2016). Administrators who deliver immaterial feedback to teachers are more apt to produce instruction void of skills essential to improving student learning in a focused content area (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Vogel, 2018). An evident gap exists between instructional feedback and constructing best practices in mathematical pedagogy (Lochmiller, 2016; Rigby et al., 2017). Common practices in mathematics education should include applying inquiry instruction which promotes rigorous instruction for conceptual understanding (Rigby et al., 2017). Best practices to boost mathematical instruction can reveal how instructional leadership integrates feedback practices to foster teacher construction of new knowledge in mathematics pedagogy.

A study on rigorous, inquiry-oriented mathematics learning in Chicago's public schools revealed clear supports for mathematics instruction resulted in greater student achievement gains (Rigby et al., 2017). Supports included provisions at the school level which required principals and school leaders to be instructionally savvy about practices to improve mathematics pedagogy (Rigby et al., 2017), although requiring rigorous and inquiry-based mathematics instruction requires school leaders have an enriched understanding of mathematical content and the dominant practices which dictate the how-to of teaching the math curriculum (Lochmiller, 2016; Rigby et al., 2017). Feedback in mathematics resulting from performance evaluation should

provide instructors with explicit, content-based information which leaves little uncertainty the school leader has expert knowledge in the mathematics field.

The Divergence of Instructional Feedback

Feedback interventions fail because content feedback relative to pedagogy should include more than mere evaluation and contextual information (Luffarelli, Goncalves, & Stamatogiannakis, 2016). Many effects of performance feedback can impact suboptimal levels of performance, and consideration can be given to more than just one outcome (Luffarelli et al., 2016; Swift & Peterson, 2018). The essential intention of performance feedback is ineffectual unless the efficacy of the feedback is determined by the difficulty of the task and personality of the receiver (Swift & Peterson, 2018). The arguments indicating more than one construct can influence feedback do not undermine the need for administrators to acquire content knowledge to deliver useful feedback (Luffarelli et al., 2016; Swift & Peterson, 2018). The limitations of Luffarelli et al.'s (2016) and Swift and Peterson's (2018) studies supported the need to further study not only the receiver of the feedback but also the giver.

Critics of teacher evaluation systems, feedback, and instructional improvement note most behaviors and actions reported by school leaders and teachers are self-reported (Lavigne & Chamberlain, 2017). More studies and more data regarding the behaviors and actions of school leaders are necessary to gain further perspectives into how school leaders spend their time (Lavigne & Chamberlain, 2017). Because school leaders demonstrate a significant influence on setting expectations for instructional improvement, responsibility for expert and focused feedback is rooted in the behaviors of the school leader (Lavigne & Chamberlain, 2017; Luffarelli et al., 2016; Swift & Peterson, 2018). Feedback processes as a part of professional skill

building are only one aspect of school leadership, and attention needs to be given to other constructs of feedback (Luffarelli et al., 2016; Swift & Peterson, 2018).

Mathematics Instruction

The American Institute of Research (as cited in Sparks, 2018) investigated the effects of teacher pedagogy on 1,000 students in math and English classrooms. In classrooms in which teachers received substandard mathematical feedback from school leaders, data demonstrated decreased student performance (Sparks, 2018). Further investigation revealed relevant curriculum feedback in mathematics was a missing attribute of performance evaluation, implying deepening administrator knowledge of curriculum is vital to increased student success (Sparks, 2018). The results of Sparks's (2018) study signified the need for researchers to examine the influence of explicit and constructive feedback on teacher and student success in the classroom. For teacher pedagogy in mathematics to improve, school leader feedback in mathematics must be precise and relevant to the content area (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017).

School leaders have insufficient contextual expertise in mathematics to ensure improved teacher pedagogy in mathematics (Brauckmann et al., 2016; Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). To certify improved teacher pedagogy in mathematics, school leaders should integrate proficient instructional leadership practices, content expertise with feedback, and quality mathematical teaching practices (Donahue & Vogel, 2018; Lochmiller, 2016). The school leader is the first and foremost teacher of professional learning and in charge of all instructional operations (Brauckmann et al., 2016). Evidence shows the necessity of school leader expertise to move classroom instruction forward, but a gap exists between school leader expertise, performance

evaluation feedback, and teacher construct of new knowledge (Brauckmann et al., 2016; Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017; Sparks, 2018).

Performance evaluation experiences provide school leaders with the opportunity to demonstrate instructional leadership in mathematics by giving teachers meaningful and constructive feedback (Mireles-Rios & Becchio, 2018). School leaders who actively sought to increase knowledge of the mathematics curriculum collaborated with faculty members to help construct new curriculum knowledge and improve classroom pedagogy in mathematics (Lochmiller, 2016). Enhanced and explicit mathematics feedback is pertinent to the mathematics curriculum and essential to inspire improved teacher pedagogy (Lochmiller, 2016). Elementary teachers are especially vulnerable to the negative implications of insufficient feedback in intermediate mathematics instruction (Lochmiller, 2016).

Instructional Leadership in Mathematics

Instructional leaders need to possess a deeper understanding of various mathematics curriculum frameworks and the influence on instructional pedagogy (Plaatjies, 2019). School leaders should possess adequate knowledge of the math course, instructional methods, formative assessment in mathematics, and best practices for teaching and learning (Donahue & Vogel, 2018; Lochmiller, 2016; Plaatjies, 2019). Appropriate knowledge of the mathematics content can enable school leaders to assist teachers to develop the professional skills necessary for evolved mathematical pedagogy. Frequent engagement with teachers, through cyclical performance evaluation and feedback, appeared to be the most influential process in helping teachers develop professional skills (Mireles-Rios & Becchio, 2018; Plaatjies, 2019; Rigby et al., 2017). A relentless focus on the school leader as the instructional leader promotes teacher engagement

with content and professional dialogue regarding content instruction (Plaatjies, 2019). A school leader's ability to execute rigorous administrative duties is one of the most important responsibilities of instructional leadership (Plaatjies, 2019).

Supervision of instruction comprises the monitoring and feedback processes which provide guidance and support to enable teachers to impart effective mathematics strategies in practice (Lochmiller, 2016). School leaders should have a clear vision of mathematics instruction to give teachers well-defined and succinct feedback on mathematics education connected to classroom learning. Cyclical performance feedback provides teachers with relevant strategies and skills in mathematics (Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Plaatjies, 2019; Rigby et al., 2017). To be effective mathematics instructional leaders, school leaders should offer expert feedback to assist teachers in choice of high-quality strategies, resources, and undertakings in mathematics (Lochmiller, 2016; Plaatjies, 2019).

Feedback in Intermediate Mathematics

An investigation of the significance of content-specific and detailed mathematics feedback revealed school leaders tended to generalize feedback (Lochmiller, 2016). Instead of focusing on the intricacies of the curriculum necessary to improve and deepen pedagogical knowledge, feedback from school leaders was concentrated on overall strategies and classroom management (Lochmiller, 2016). Results indicated teachers who received feedback from school leaders were not convinced the feedback was valid or aligned with mathematics content (Lochmiller, 2016). The outcome was decreased teacher confidence in the expert knowledge of the administrator in mathematics (Lochmiller, 2016). Feedback received as a result of performance evaluation was deemed inconsequential for student achievement, lacking in data, and did not deepen teacher knowledge of the mathematics discipline (Lochmiller, 2016).

Proficient school leadership cannot occur if the school leader does not acquire sufficient knowledge of the intricacies of content area curriculum (Lochmiller, 2016).

An inferred outcome of Lochmiller's (2016) study is the asynchronous influence of misaligned school leader expertise in mathematics on intermediate teachers. School leaders appeared to have the propensity to either ignore targeted mathematical instructional support or lack the time necessary to divulge expertise as instructional leaders. A study revealed school leaders spent less than 10% of time engrossed in instructional leadership (Austin, Anderson-Davis, Graham, & White, 2018). The daily school leader agenda was not organized to lend time for school leaders to be seen as central instructional figures in content-area management (Austin et al., 2018). If a school leader spends an inordinate amount of time ignoring content expertise, teachers may perceive the school leader as having insufficient mathematical content knowledge to provide relevant feedback.

To decrease math anxiety when educators are exposed to math curriculum, teachers should have learning opportunities for professional growth in mathematics (Furner & Higgins, 2019). Building mathematical capacity in intermediate mathematics instructors is a responsibility of school leaders (Furner & Higgins, 2019; Lochmiller, 2016). Teacher leaders should be expertly prepared to assist teachers by supporting the intermediate curriculum with detailed suggestions, strategies, content knowledge, data, and leadership skills (Furner & Higgins, 2019). Collaborative feedback efforts can sustain and encourage further professional skill building in complex mathematics instruction (Donahue & Vogel, 2018; Furner & Higgins, 2019; Lochmiller, 2016). Educator comprehension of intermediate mathematical concepts is a significant element of teacher efficacy and student success (Furner & Higgins, 2019).

Instructional leaders are responsible for professional learning, including professional skill building, implications to motivate, extending mathematical knowledge, and demonstrating expertise with relevant content-area feedback (Furner & Higgins, 2019). Educational leaders have the distinct assignment of bearing witness to how teachers grow skills in the intermediate mathematics curriculum. Accountability for bridging school leader expertise, instructional leadership, and professional skill building falls on the leadership of the school (Lochmiller, 2016). Leadership knowledge in mathematics has the potential to increase teacher skills and improve mathematical pedagogy in the classroom (Rigby et al., 2017).

The Gap in Research

Research on the influence of mathematical feedback on teacher pedagogy emphasized school leader feedback pertained to classroom management instead of content (Lochmiller, 2016; Rigby et al., 2017). The phenomenon suggests school leader competence to provide math teachers with relevant and constructive feedback is limited. Although a wealth of literature on instructional leadership and school leader expertise as distinct constructs was available, the integration of mathematical instructional leadership appeared to be a less studied phenomenon. Further research is necessary to investigate how focused and expert school leader feedback in intermediate mathematics can motivate teachers to deepen understanding of the practices necessary to impact student achievement.

Chapter Summary

A review of the literature revealed the importance of understanding instructional leadership and how school leader feedback influences the teacher's perspective of administrator expertise. The study was grounded in leadership and constructivist theories. Fundamental to constructivist theory is the establishment of the learner as the core of the work and how

knowledge is constructed through the building of information acquired through a master facilitator (Dewey, 1986; Piaget, 1953; Vygotsky, 1978). The focus of the study was to address the gaps between leader expertise, relevant feedback, and practical intermediate mathematics pedagogy. School leaders need to be cognizant of proliferating content knowledge and best practices in multiple content areas (Ali, 2017; Donahue & Vogel, 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Plaatjies, 2019; Rigby et al., 2017).

Astute school leaders who dynamically participated in mathematics classrooms built relationships with instructional staff and increased teacher content knowledge (Ali, 2017; Bellibas & Liu, 2017; Donahue & Vogel, 2018; Lochmiller, 2016). The practice of instructional leadership renders the leader more capable of providing feedback relevant to mathematics instruction (Ghavifekr et al., 2019; Lochmiller, 2016). If feedback given to a teacher during a performance evaluation does not connect to the content area, offer best practices, or highlight the dominant structure of the discipline, the teacher can be left feeling unsupported and professionally void of new skills (Donahue & Vogel, 2018).

The following sections present the research design, methodology, methods, analysis, ethical issues, and reliability and validity of the research study. The rationale for the selection of a qualitative exploratory case study is reviewed and addressed through collecting evidence using semi-structured interviews and open- and closed-ended questionnaires. The role of the researcher and procedures for recruitment and selection of participants are specified. Data preparation, data collection, and data analysis are explored in conjunction with reliability, validity, and ethical research practices.

Chapter 3: Methodology

School leaders who deliver intermediate mathematical feedback can have a significant influence on the way teachers assert new pedagogical practices in the classroom (Hattie, 2015). Feedback provided by school leaders in intermediate mathematics should be targeted, focused, evidence-based, and contain relevant curriculum knowledge (Lochmiller, 2016). The purpose of the qualitative exploratory case study was to investigate the scope and relevance of teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in intermediate mathematics classrooms in Florida. Qualitative research is executed when the data to be collected are contingent on a plethora of perspectives and responses from the research participants and the cognizance of initiating an exploratory approach to understanding a phenomenon (Creswell & Creswell, 2018). A case study is differentiated from other types of qualitative studies by focusing on context and the distinction of an investigation concerning a group or population (Creswell & Creswell, 2018; Yin, 2016, 2018).

The underlying assumptions were the scope of leader expertise perceived by teachers when content-specific feedback is delivered in intermediate mathematics and how implicit and explicit expertise in mathematics is perceived to benefit teacher pedagogy. Elucidation of the scope and relevance of school leader and teacher perceptions of expert mathematical feedback on pedagogy occurred through exploration of the phenomenon. Research questions were designed to elicit multiple perspectives of the study participants by gathering data through interviews and open- and closed-ended questionnaires regarding feedback in the intermediate mathematics classroom. The research questions were central to the essential comprehension of the research problem (Creswell & Creswell, 2018). Subject-matter questions, which garnered convergent and divergent participant perspectives, helped accumulate responses enriched with detail and

multidimensional viewpoints (Creswell & Creswell, 2018). The following research questions guided the qualitative exploratory case study:

Research Question 1: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?

Research Question 2: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?

The following sections include research design and rationale, role of the researcher, research procedures, data analysis, reliability and validity of the research study, and ethical issues. A rationale for the use of a qualitative exploratory case study is described through the process of collecting data from semi-structured interviews and open- and closed-ended questionnaires.

Research Design and Rationale

A qualitative exploratory research method was chosen to conduct the investigation. Qualitative research is an approach used for attaining knowledge and discerning the significance groups or individual persons attribute to a phenomenon of interest (Creswell, 2016). The qualitative research method ascertains a process in which questions transpire into procedures for investigating a problem (Creswell, 2016). Data were collected in the participants' natural setting with an inductive analysis generating the elements of the study into broad themes and understandings (Creswell, 2016). More than the complex selection of a qualitative method, the research design was selected based on the purpose and questions of the exploration (Creswell & Creswell, 2018).

An exploratory case study design yields multiple rich perspectives despite including a smaller number of participants through systematic data collection (Creswell, 2016). Case studies

are conducted to explore a complex idea and provide a comprehensive analysis. Case studies are ideal for exploring how and why, capturing emotion and tone, and collecting various data with the means of hosting various perspectives (Yin, 2018). As the study was conducted in a real-life context, a holistic, single-case exploratory case study was selected to explore multiple perspectives and identify the influences of relevant mathematical feedback on intermediate teachers of mathematics (Yin, 2018). Single-case studies permit the exploration of a set of circumstances to determine whether proposals are correct or if some other offer of explanation is pending (Yin, 2018).

The single-case study engendered proximity to the research participants to extract sustainable and valid perspectives (Yin, 2018). Inductive and constructive elements of data collection for the exploratory case study revealed the perceptions of the participants to provide a description of the impact of mathematical feedback and school leader content knowledge on the intermediate mathematics instructor. The insight gained from exploring intermediate teacher and school leader perspectives on the importance of relevant mathematical feedback effectively promoted the context of content knowledge and intermediate mathematical pedagogy (Creswell & Creswell, 2018).

Role of the Researcher

In qualitative exploratory studies, the researcher is used as an instrument to collect and analyze data (Creswell, 2016; Creswell & Creswell, 2018; Patton, 2015). An existential goal of qualitative research is to investigate a phenomenon and preserve the integrity of the research, so the role of the researcher should be scrutinized with transparency and honesty (Creswell, 2016). Attention to the role of self was necessary to identify and diminish bias regarding knowledge of the research subject (Patton, 2015). For the study, the role of the researcher was as an observer,

an intermediate educator who operated in the same setting as the participants, a teacher of mathematics, and one who was provided feedback for mathematics instruction. Reflexivity was an essential element of self-awareness and proprietorship over self-perceptions in the qualitative study (Patton, 2015).

Because participants were considered equals as colleagues, the researcher had no power over the participants, and participation in the study was through voluntary informed consent. Incentives in the form of administrator-approved compensatory time was an option presented to those who participated in the study, but no monetary or additional incentive was offered. Assiduity limited confirmation bias of working within the school system and assisted with the awareness of predispositions and adherence to ethical research practices. To minimize bias and enable credibility, dependability, transferability, and confirmability, the researcher utilized a journal to reflect on the influence of the antecedent knowledge of participants, relationships within the study environment, and subject matter (Patton, 2015).

The exploratory case study involved the researcher's close contact as a witness and observer with colleagues and school leaders in a familiar work environment. Conducting research within a familiar environment compelled significant ethical groundwork. Assurance was given to the participants of their rights to privacy, protection from harm, protection of educational processes, and protection from misappropriation of data collected for the purpose of the research investigation (U.S. Department of Health and Human Services [HHS], 2018; Wester, 2011).

Research Procedures

Valid and reliable research moderately depends on the research procedures and how the procedures are defined within the research report (Creswell & Creswell, 2018). The procedures

outlined in the following sections were succinctly designated to implement rigorous data collection and minimize study bias. Segmented and well-stated research procedures permit individuals to repeat the investigation in advanced or future studies (Creswell & Creswell, 2018). The following research procedures provide effective descriptions of the population, sample, and instrumentation for the study.

Population and Sample Selection

The studied school district in Florida is large and can be divided into three distinct subareas. Two of the subareas are considered urban, and one is considered suburban. For the exploratory case study, the population was within one elementary school located within the suburban boundary. The elementary school studied is a public pre-K–Grade 5 school with 762 students, 72 instructional personnel, and 10 members comprising the school leadership team (Florida Department of Education, 2019). Thirteen intermediate mathematics instructors, the principal, assistant principal, and math coach, who are responsible for providing feedback and developing mathematical pedagogy in the building, were the target population for the study. Investigating participant perceptions of school leader content expertise through various perspectives increased the understanding of mathematical feedback on teacher pedagogy.

Sampling for the investigation was purposive. In qualitative research, purposive sampling is widely utilized for the selection of study participants (Patton, 2015). Designated case studies involve the deliberate choice of nonrandom sampling (Patton, 2015). The sample criteria included one case of at least three intermediate teachers in each Grade 3–5 who were responsible for implementing the general education mathematics curriculum and three school leaders—the principal, assistant principal, and math coach—who were responsible for providing feedback in mathematics. Criteria for the selection of participants were designed to elicit information from

participants proficient in the phenomenon of interest, experienced with teaching intermediate mathematics, and who would help achieve accurate capture of the diversity of the intermediate sample population. Participant availability, willingness to take part in the study, reflective experience with feedback, and teaching intermediate mathematics were also considered in the development of the criteria (Bernard, 2017).

Proper documentation of permission to conduct the study in the elementary school in the Florida school district was included in the procedures for recruiting participants. The school district's office of strategy management required a descriptive and detailed report on the study. Once district approval was obtained, virtual and face-to-face meetings were held with the elementary school administrators detailing the study and requesting permission to proceed at the school site (see Appendix A). A recruitment letter and informed consent were e-mailed to intermediate teachers, Grades 3–5, and school administrators in the elementary school once the study was approved through school administration (see Appendix B). Recruitment techniques involved one-on-one and internal e-mail approaches (Creswell & Creswell, 2018).

Participants were informed of the study through a detailed e-mail and face-to-face or virtual interest meeting. An adequate explanation of the study, rights of participants, ethics, and the particulars of informed consent were discussed during the interest meeting. Informed consent forms were disseminated face-to-face and electronically and explained to participants who volunteered to be a part of the investigation (see Appendix C). Subsequent to informed consent, participants were reevaluated to confirm a reliable sample was purposively designated from the population (Patton, 2015).

Instrumentation

The nature of the case study required detailed information regarding intermediate mathematics to be collected from participants (Yin, 2018). The investigation necessitated the creation of three original instruments to be used for data collection. One open-ended and one closed-ended questionnaire were developed to collect data from mathematics teachers, the principal, the assistant principal, and the math coach. Two interview protocols—one for intermediate mathematics teachers and one for the principal, assistant principal, and math coach—were used as instruments for the study.

Questions for the open- and closed-ended questionnaires and interviews were developed through content-based research related to classroom evaluation, school leader competency frameworks, school leader competency rubrics, and pedagogical constructivism. To validate the questions and information on the questionnaire and interview, 15 content experts were contacted via e-mail to ask for feedback (see Appendix D). Once the content experts offered feedback and school district and Institutional Review Board (IRB) approval were received, original open- and closed-questionnaire and semi-structured interview questions were implemented to collect data to answer the research questions.

Interviews were considered the primary source of data collection, and open- and closed-ended questionnaires supported the information gathered through the interview process (Creswell & Creswell, 2018). While 15 other members of the institution who teach mathematics or lead others by providing the means and resources to influence mathematics pedagogy were contacted to field test the questionnaire and interview questions, only three provided feedback. Field testing the four instruments revealed necessary modifications to further improve the construct validity, content validity, and reliability of the instruments (Creswell, 2016; Yin, 2018).

Open- and closed-ended questionnaires were designed to elicit participants' honest and revealing responses about mathematical feedback. Semi-structured interviews enabled the collection of data with the flexibility of the natural setting with the recourse of including supplementary questions or refocusing the interview purpose (Yin, 2018). As a result, the data had the potential to contribute new insight and knowledge regarding perceptions of how school leader feedback influences mathematical pedagogy. The methods of data collection strengthened the validity and reliability of the information gathered during the research process (Creswell & Creswell, 2018).

Questionnaires. For each open- and closed-ended questionnaire, a recruitment letter was e-mailed directly to participants via the school district's e-mail platform and connected to SurveyMonkey via a secure link and password (see Appendix E). The decision to send the questionnaire via a link through e-mail was in consideration of the time and responsibilities of the participants (Yin, 2018). Asking participants to sacrifice planning time or lunchtime to answer additional questions was not in the best interest or with regard to the time teachers or administrators need to prepare for the school day. Each participant had the choice to respond to questions when time permitted, though a reminder was e-mailed a week later asking the participant to complete the questionnaire.

Open-ended questionnaire. The open-ended questionnaire contained five questions, none of which had more than two parts (see Appendix F). The open-ended questionnaire required participants to respond with short answers to questions regarding mathematical pedagogy and content-area feedback. In qualitative research, using an open-ended questionnaire enables detailed and divergent responses from participants to be collected (Yin, 2016). Open-ended questionnaires can capture unexpected participant insight, which can help to understand

participants' thinking processes and deter bias (Yin, 2016). The questionnaire was field tested with three members of the organization who held positions similar to the study participants.

Closed-ended questionnaire. Writing the closed-ended questionnaire required the deliberate and substantive measure of the explored phenomenon and augmenting the scope of the study (Yin, 2016). The closed-ended questionnaire included 10 questions with two to three button responses (see Appendix G). A primary purpose of the closed-ended questionnaire was to determine the similarity between participant responses regarding mathematical pedagogy and content-area feedback (Yin, 2016). Closed-ended questionnaires provided participants with a quick and straightforward means to provide responses (Yin, 2016). Answers to closed-ended questionnaires are easier to compare, code, and analyze than open-ended responses. The questionnaire was field tested with three members of the organization who held positions similar to the study participants.

Semi-structured interviews. Semi-structured interviews are appropriate for research when prior knowledge of the subject matter exists (Yin, 2018). Interviews are necessary when historical or real-time perspectives cannot be directly observed (Creswell & Creswell, 2018). During the semi-structured interview, real perspectives of school leaders and teachers were collected regarding feedback and content-area knowledge in the mathematics classroom. The goal of the semi-structured interview process was to uncover information from the respondents regarding the importance of content-area feedback in the intermediate mathematics classroom (see Table 1). Interview questions were field tested and reviewed by three subject-matter experts for the purpose of yielding edits or revisions to further clarify questions.

Table 1

Alignment of Interview Questions to Research Questions

Interview question	Research question
1. Describe your beliefs about content knowledge pedagogy.	RQ1
2. Consider feedback you have received in mathematics. Describe how school leaders provide feedback in mathematics.	RQ1
3. Describe how you feel or ideas you have when school leaders are providing feedback mathematics.	RQ1
4. Describe what you perceive as effective in determining how school leaders give mathematical feedback.	RQ1
5. Describe how you have used feedback from school leaders in the mathematics classroom.	RQ1
6. Describe your beliefs about content knowledge and school leader content-area mathematical expertise.	RQ2
7. Describe your beliefs about school leader content knowledge and teacher pedagogy in mathematics.	RQ2
8. Consider the feedback you have delivered in mathematics. Describe how you, as the school leader, have delivered the feedback.	RQ2
9. Describe how you feel when you are delivering feedback in the intermediate field of mathematics.	RQ2
10. Describe what you perceive as effective in determining how mathematical feedback is received by intermediate teachers.	RQ2
11. How have you seen teachers use feedback in intermediate mathematics in the math classroom?	RQ2
12. Describe any professional development undertaken to increase math proficiency in teacher pedagogy.	RQ2

With permission from the school district, interviews were conducted either face-to-face on the elementary school campus or via Zoom, an online conferencing platform, in a confidential location at a time convenient to each of the study participants. If a virtual Zoom conference was the method of contact, a password was required to enter the conference. To stay mindful of

participant time and professional responsibilities, the interview was limited to eight questions with the provision for follow-up inquiries or prompts for information related to the purpose of the study (see Appendix H). The interview process followed five guidelines and was composed of (a) basic information describing the interview process and introductions; (b) small talk between the interviewer and interviewee; (c) interview form and questions; (d) probing for clarification, and (e) closure (Creswell & Creswell, 2018). Following the guidelines proposed by Creswell and Creswell (2018) ensured each study participant was treated ethically during the interview process.

Data Collection

Yin's (2018) four principles of data collection were employed to certify the quality of the data collected. The collected data were kept safe in a database using NVivo Plus software (Yin, 2018). Pseudonyms such as Teacher 1, School Leader 1, and so forth, were used to protect participant information, and participant data were recorded on a matrix created in NVivo to keep a record of findings (Yin, 2018). NVivo assisted with the large amount of information, coding for emerging themes, and maintaining the chain of evidentiary support (Creswell & Creswell, 2018; Yin, 2018). The foremost strength of case study data collection is the ability to collect diverse sources of evidence (Yin, 2018). To enhance and substantiate evidence and triangulation, data were amassed from semi-structured interviews and open- and closed-ended questionnaires.

Open- and closed-ended questionnaire data. Completed questionnaires were collected using the SurveyMonkey website. Two questionnaires were created and uploaded into SurveyMonkey. Questionnaire 1 contained open-ended questions and Questionnaire 2 contained closed-ended questions. Both questionnaires contained questions probing perceptions of feedback and school leader expertise in the intermediate mathematics classroom. A link to the

questionnaire was sent to teachers of intermediate mathematics and school leaders via internal school e-mail. Within eight days, a second e-mail containing the questionnaire link was sent to remind participants to complete the questionnaire (see Appendix I). Graphs from SurveyMonkey and questionnaire responses were reviewed for content and systematically categorized by emerging themes (Creswell, 2016).

Semi-structured interview data. Semi-structured interviews were conducted face-to-face and via Zoom in a confidential location. Responses to interview questions were recorded manually on the interview form, audiotaped using NVivo Plus, and recorded using Zoom to strengthen data collection and minimize bias (Creswell & Creswell, 2018). Following the interview, notes and insightful analysis documented cognitive assumptions and conceptualizations, and safeguarded fair and nonbiased data analysis of the collected information. Notations manifesting emotions, ideas, biases, assumptions, and initial understandings were relevant to maintain the quality of data collected over the course of the investigation (Yin, 2018).

Data Preparation

Information accumulated during the data collection process was transcribed with the aid of the NVivo transcription program. An electronic program kept the data organized and accurate. The accuracy of transcription using a computer-based program also served to minimize study bias. Audio recordings were reviewed and compared against handwritten data collected on the instruments for analogous perspectives and rich detail associated with case study research (Yin, 2018). Transcripts were shared with the respective participants to provide authentication and accuracy of participant statements (Yin, 2018).

Data collected from open- and closed-ended questionnaires were transcribed and graphed electronically via SurveyMonkey. Gathering data through the web-based program captured additional information which may have been overlooked during the interview process (Creswell & Creswell, 2018). SurveyMonkey is a web-based program which stamps the date and time on the responses and sends notifications via e-mail when the questionnaire is ready for review. The results of the questionnaires were printed for corroboration and alignment with data collected through other means (Creswell & Creswell, 2018; Yin, 2018).

All confidential information about participants will be kept on a secured passcode-protected computer with restricted access (HHS, 2018). Participants were referred to as Teacher 1, School Leader 1, and so forth, with consecutive numbers assigned to subsequent participants. Data will be kept secure for a minimum three years and then destroyed using best practices. Participants were asked to participate in a debriefing meeting for the purpose of assuring the work was beneficial to the mathematical teaching profession. Once the final report is approved, the information will be shared with participants, the school, and the school district. Furthermore, the report may be considered for review and submission for publication in an education database.

Data Analysis

Qualitative data are often analyzed using an inductive approach and by assigning labels to phrases, sentences, or paragraphs in a descriptive or summative manner (Creswell, 2016). In qualitative research, data analysis begins with reading the information gathered during the data collection process (Creswell, 2016). During the data analysis phase, the collected data were compiled into codes and themes (Creswell, 2016). For the qualitative exploratory case study, codes and themes were established from the ideas, exchanges, interviews, and responses of the

research participants (Creswell & Creswell, 2018). NVivo Plus was used to ensure data were coded and categorized in an organized and efficient system.

During the initial coding, data were reviewed, and initial thoughts and ideas were recorded, providing access to the inception of interconnected ideas and categories (Creswell, 2016). Systematically, data were input into NVivo Plus, and Creswell's (2016) process of coding data was followed. Sections of data were coded with broad categories, and descriptive notes were kept in a journal (Creswell, 2016). After initial coding, axial, or deeper line-by-line, coding occurred to look for focused connections and relationships (Creswell, 2016). Coded data were categorized and placed in a framework with familiar coding in similar categories (Creswell, 2016). The framework provided a parameter by which to search for deeper and connected categories and reduced superfluous or imbricating codes (Creswell, 2016). Codes were collapsed and reduced using Creswell's process, and later became the major findings from the study.

Reliability and Validity

The nature and design of qualitative research design requires extra effort in the quality of each component of the study (Creswell & Creswell, 2018; Yin, 2018). Credibility, transferability, dependability, and confirmability of the research were scrutinized through attention to data collection, analysis, interpretation, and reporting of the results (Patton, 2015). In a qualitative study, data collected should be constant and trustworthy (Creswell & Creswell, 2018). Most importantly, the credibility of a qualitative study should establish internal and external validity, which make the study convincing (Yin, 2018).

Credibility was established through multiple sources of data collection with the study participants. Data were thickened with rich descriptions of information, participant responses, and accurate reflection of participant perspective (Creswell & Creswell, 2018). Interview

questions were reviewed by content experts, and the questions were revised based on the feedback. The established practice of field testing the questions before disseminating the questionnaires to participants has been recognized as an effective way to validate the questions (Yin, 2016, 2018).

Data collected from diverse participants permitted multiple points for verification of the experiences and perspectives of each participant. Three sources of data collection—interviews, open-ended questionnaires, and closed-ended questionnaires—verified the data were triangulated and designated accurate interpretations from the findings (Yin, 2016). Findings from the study were shared with the study participants to check for accuracy and truthfulness (Creswell, 2016). Thick and rich descriptions of the experiences explored in the study in conjunction with using multiple participants to enhance data collection provided the means to determine transferability (Creswell, 2016).

Confirmability required acknowledgment of the assumptions, limitations, and latent influence on the outcomes of the study (Patton, 2015). Explicit self-analysis to maintain awareness of one's viewpoints occurred through the process of researcher reflexivity (Patton, 2015). Limited bias and confirmability of the research report were maintained through the use of the researcher as an instrument, journaling, and keeping track of assumptions, predispositions, reactions, and opinions (Patton, 2015).

Ethical Procedures

Research methodology incorporates ethical practices to protect the study participants (Creswell & Creswell, 2018; Tangen, 2014; Yin, 2016). Tangen's (2014) general ethical matrix was employed to examine internal and external factors which maintained ethical responsibility and ensured comprehensive protection of all study participants. Prior to conducting research for

the study, IRB approval was received through submission of all letters, forms, and instruments to demonstrate the intention to adhere to the rights of research participants.

All the research participants were older than 22 and able to make an autonomous decision to participate in the research process. Through informed consent, participants were informed of their rights, the explicit purpose of the research study, and how data would be disseminated (see Appendix C). Informed consent was inclusive of all essential knowledge and risks, processes and essentials of the investigation, participant human rights, and discretion (HHS, 2018). Participants were not forced to participate in the study and participating in and responding to interviews and questionnaires were voluntary (HHS, 2018).

All data will remain stored on a passcode-protected laptop and encrypted hard drive for a minimum of three years. Pseudonyms such as Teacher 1, School Leader 1, and so forth, were assigned to protect individual identities, and any data which permitted the identification of an individual were removed, excluded, or destroyed. No personal information was revealed, and efforts were made to maximize the autonomy of all study participants (Creswell & Creswell, 2018; Yin, 2016). The right to know and the right to privacy were closely scrutinized before making the final decision to present the information contained in the research report.

Chapter Summary

The previous sections outlined the methodology of the research study. The rationale for choosing the exploratory case study to investigate elementary teacher and school leader perceptions of content-area feedback on pedagogy in intermediate mathematics was elucidated. The role of the researcher, data collection, data analysis, reliability, validity, and ethical considerations were described in detail. Semi-structured interviews and open- and closed-ended questionnaires were generated to gather data for the exploratory case study. The following

sections encompass the study results, including the analysis of the data collected from interviews and questionnaires.

Chapter 4: Research Findings and Data Analysis Results

School administrator feedback in mathematics can substantially impact how Grade 3–5 math instructors implement classroom practices and pedagogies relevant to the content-area discipline (Lochmiller, 2016; Rigby et al., 2017). A qualitative exploratory case study method enabled the collection of data from school leaders and elementary school teachers to explore perceptions of school leader feedback and expertise in intermediate mathematics. The purpose of the qualitative exploratory case study was to investigate elementary teacher and school leader perceptions of content-specific feedback on teacher pedagogy in intermediate mathematics classrooms in Florida.

The problem was the scope and relevance of content-based feedback delivered by school leaders to intermediate mathematics teachers did not provide adequate means for improved instructor pedagogy (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). A significant amount of literature has focused on school leader feedback in reading, science, and high school mathematics education (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017). Less research emphasis has been placed on intermediate mathematics and the influence of school leader expertise on perceptions of teacher pedagogy and classroom instruction.

Subsequent sections include descriptions of the data collection process, data analysis, results, and reliability and validity of the study. Categorical data were accumulated through face-to-face and virtual semi-structured interviews and open- and closed-ended questionnaires. The following research questions guided the study:

Research Question 1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?

Research Question 2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?

Data Collection

Data collection occurred over three weeks in one suburban elementary school in Florida, and 16 participants were purposively selected for the study (see Appendix B). The participant pool consisted of 13 intermediate mathematics teachers and three school leaders. Data were collected by conducting virtual and face-to-face semi-structured interviews and from open- and closed-ended questionnaire responses (see Appendix E). A 20-minute meeting was held with each participant for a personalized, concise, and detailed explanation of the research study and to gain informed consent (see Appendix C). Fifteen of the 16 participants signed the informed consent during the first two weeks of August. The 16th participant signed the informed consent during the last week of September. After receiving approval to commence research, duplicates of the signed informed consent forms were distributed to each participant and a reminder of participation in the study was e-mailed after school hours via a professional e-mail system (see Appendix I).

Semi-structured Interviews

Semi-structured interviews were held face-to-face or via passcode-protected Zoom conferences over 10 days. Ten of the 16 participants were willing to participate in the interview process: three school leaders and seven teachers. Each interview lasted between 25 and 30 minutes. Participants answered a total of eight interview questions, with intermediate mathematics teachers responding to the questions designated for teachers and school leaders responding to the questions selected for school leaders (see Appendix H). All interviews were

conducted after school either at the school site or via a home setting, in a private location of the participant's choosing.

In each interview, detailed notes on participant expressions, reflections, and perspectives were recorded on the interview form (Yin, 2016). Nine of the 10 interview participants were asked one to two probing questions to enhance understanding of a response to a previous inquiry. NVivo Plus recorded each interview to have continuous access to rich and meaningful data with the intent and purpose of exploring participant perspectives (Yin, 2016). Each audio recording was labeled with the participant number, date of the interview, and whether the interview was conducted face-to-face or via Zoom.

Questionnaires

The open- and closed-ended questionnaires were created using the online tool SurveyMonkey, which comprised demographic inquiry (see Table 2) and reflected changes based on field testing the original questions (see Appendix F). After the questionnaire questions were input into SurveyMonkey, an e-mail was sent to participants with a link to the SurveyMonkey website (see Appendix E). Participants were asked to complete the questionnaire within two weeks; an e-mail was sent a week later to remind participants to finalize questionnaire responses (see Appendix I). Questionnaire responses were collected using SurveyMonkey. All 16 participants submitted responses to the open- and closed-ended questionnaires. Graphs of the responses were created using online tools in SurveyMonkey, and a Microsoft Excel electronic database was used to record participant responses and quotes addressing the research questions.

Table 2

Participant Demographics

Variable	No. responses	%
School position		
Administrator	2	12
Math lead	1	6
Classroom teacher	13	81
Years leading or teaching		
0–5	0	0
6–10	5	31
11–15	3	19
16–20	4	25
20+	4	25
Degree in school leadership		
Yes	6	40
No	10	60

Table 2 displayed participant demographics provided as part of the questionnaires. The information collected from participants was perceived as important because a good understanding and description of feedback in content areas often comes from teachers who have at least five years of experience teaching in the classroom (Rigby et al., 2017). Likewise, school leaders who have several years of experience in a leadership role are more prone to giving teachers applicable feedback in mathematics (Lochmiller, 2016). Every participant had over five years of experience as a teacher or school leader.

Data Analysis

A qualitative method was used for data analysis. Through the data analysis process, emerging themes of the participants' experiences were examined (Creswell & Creswell, 2018). Examining questionnaire responses and interview transcripts required two weeks of intensive

scrutiny. The data analysis phase enabled a deeper understanding of the data collected and a broader comprehension of the major themes which emerged (Creswell & Creswell, 2018).

The analysis of data adhered to the processes outlined by Creswell (2016). Following Creswell's framework for coding data allowed the information to be framed within categories for deeper understanding of participant perspectives. During initial coding, transcribed data from semi-structured interviews and open-ended questionnaires were deconstructed, and initial thoughts and ideas were recorded in a secure, passcode-protected electronic database (Creswell, 2016). Data were systematically entered into NVivo Plus, and sections of data were then coded with broad categories and interconnected and linked ideas were marked and recorded in the electronic database (Creswell, 2016). After initial data were categorized, axial coding was used to deeply explore the synthesis of interconnected ideas (Creswell, 2016). Through axial coding, the determination of how participant responses and statements were related helped categorize themes to establish alignment with the research questions (Creswell, 2016). Data were then constructed in tables to make the information more visually appealing in the manuscript.

The process of using codes led to the final context of themes best explained by referring to the theoretical framework for the study. With respect to intermediate mathematical feedback, the constructivist and instructional leadership theories were applied in the disaggregation of data and construction of ideas about feedback and feedback processes. Constructivist theories focused on the individual and how the individual acquires new learning through interactions within the environment (Dewey, 1933; Vygotsky, 1978).

As a more progressive approach to learning, the ideas of constructivism may transfer to how school leaders facilitate the acquisition of content-area knowledge for teachers. Born out of the progression of constructing new ideas and instructional leadership, the various perspectives

analyzed through collected data focused on how teachers applied and constructed new mathematical knowledge from school leader feedback. School leaders hold the responsibility of evaluating teacher performance and providing relevant and specific feedback to promote instructional improvement (Vogel, 2018). Combining experience with expertise can allow school leaders to appeal to the teacher's inclination to learn and motivate the teacher to proceed forward in continuous pedagogical improvement (Neumerski et al., 2018; Vogel, 2018). The following information emphasizes the nature of the data collection and analysis of data through the lens of the constructivist and instructional leadership theories.

Participant Data

Three school leaders and 13 teachers participated in the research investigation. The participants completed face-to-face or virtual interviews lasting an average of 35 minutes. Interviews for school leaders and teachers each contained eight questions, with nine of the 10 participants answering additional probes. The open- and closed-ended questionnaires were completed in an average time of 15:53 minutes. More than 20 codes were generated from the data, which were further organized into four categories. Categories were continuously reduced and collapsed until significant topics were identified to target the research questions (Creswell & Creswell, 2018).

Semi-Structured Interviews

Exploring data collected through interviews was an extensive process and required immersion into transcript notes to allow for deeper understanding and premise of participant perspectives (Yin, 2018). NVivo Plus was used to help protect, save, and systematize participant responses. Furthermore, NVivo Plus facilitated data collection and inductive coding of the participant responses to interview questions.

Participant interview responses were examined for initial themes regarding perspectives of administrator expertise on intermediate mathematical feedback (Creswell, 2016; Creswell & Creswell, 2018). Interviews were audio-recorded, and transcripts were examined for alignment with notes taken during the interview process (Creswell, 2016). Through a careful exploration of the words in participants' responses, information was grouped according to similar use of language and key ideas (see Table 3). Data were subsequently categorized into themes, and line-by-line analysis of the transcripts occurred until clusters and themes were reduced to patterns, redundancy, divergence, and data saturation (Creswell, 2016).

Table 3

Key Ideas from Semi-Structured Interviews

Research question	Key ideas
RQ1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?	• Feedback in intermediate mathematics should promote growth. • Feedback should be relevant to curriculum and standards for mathematics teaching practices. • Emphasis should be placed on the methods of feedback delivery. • School leader expertise matters: feedback should be aligned with data, best practices in mathematics, standards, and curriculum.
RQ2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?	• Feedback in intermediate mathematics should promote growth, and pedagogy should be distinguished in intermediate grade levels. • Feedback should be balanced and varied in the content area. • Feedback should involve teacher reflection. • Feedback in intermediate mathematics is accepted but not consistently applied in instruction. • Finding the time to deliver relevant and specific feedback is hard.

Table 3 detailed information collected through semi-structured interviews. Participant responses were grouped into key ideas to address the research questions. Through reading the transcripts of participant responses, several ideas emerged regarding how feedback from school leaders influenced the teachers' perspectives of school leader actions.

Open-Ended Questionnaire

Information obtained from the open-ended questionnaire responses was examined and compared from each participant. The data gathered via SurveyMonkey were exported into a Microsoft Excel spreadsheet. Each open-ended questionnaire question was labeled by question number and recorded on a separate Excel worksheet page. For analysis, responses to open-ended questionnaire questions were highlighted by category and recorded according to question number and within the appropriate Excel page in the worksheets. The lettered and numbered vertical worksheet column was used to track participant responses. Participants were labeled as Teacher 1, Teacher 2, School Leader 1, School Leader 2, and so forth, until responses from Participant 16 were recorded on the worksheet.

Response categories were derived from participant responses and included: the nature of mathematical feedback, the application of feedback to instructional processes, the expertise of feedback, and the influence of school leaders on feedback practice. These categories were typed into each of the lettered vertical columns in the Excel worksheet. Initial and broad categorizing of participant responses allowed for comparison and key grouping of insight and perspectives of feedback in intermediate mathematics (see Table 4). After the initial categories and responses were included in the worksheet, the Excel framework was used for axial coding and focused relationships between the responses.

Table 4

Key Ideas from Open-Ended Questionnaires

Research question	Key ideas
RQ1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?	• Effective feedback promotes teacher growth in mathematics and includes reflective questioning. • Feedback should provide specific suggestions for pedagogical improvement by suggesting specific strategies and ideas in math. • School leaders well versed in mathematics can be significant in helping teachers improve pedagogy. • School leaders can significantly reduce the gap in mathematics learning with content expertise.
RQ2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?	• Coaching teachers is important in improving teacher pedagogy with specific suggestions, ideas, and strategies in intermediate mathematics. • Planned classroom visits and walkthroughs are necessary to support classroom instruction and observe applied feedback. • Specific feedback in mathematics is important to improving and increasing the content knowledge of classroom teachers.

Table 4 included information collected from teachers and school leaders in response to the open-ended questionnaire. The overarching key ideas were noted as relevant to the research questions and teacher and school leader perspectives about feedback in intermediate mathematics. Each tabulated response was a real-time quote from teachers or school leaders and represented information used to construct response categories and then to determine further relationships among teacher and school leader perspectives.

Closed-Ended Questionnaire

The closed-ended questionnaire consisted of a series of questions specific to the research questions and gathered participant perspectives on the significance of intermediate mathematical

feedback (see Table 5). SurveyMonkey graphs were used as a tool to compare participant responses and code and analyze the data. Initial considerations and ideas from closed-ended questionnaire responses were recorded independently of the Excel worksheet used for the open-ended questionnaire responses. The independent process allowed for further inception of interdependent ideas and interrelated categories (Creswell, 2016). After the initial process was completed, further and categorical coding occurred to reduce redundant information and collapse and further focus on finding major themes to facilitate answers to the research questions.

Table 5 includes information gathered from the closed-ended responses from teachers and school leaders regarding how feedback influences mathematics teaching practices. The response percentage is included in the table to designate which participant responses were selected most often in response to the question or prompt in the closed-ended questionnaire. The responses were analyzed for a relationship to the research questions and were used to make determinations about emerging themes in the data collected.

Table 5

Key Ideas from Closed-Ended Questionnaire Responses

Research question	Key ideas	Response %
RQ1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?	• School leader feedback is most general to the content area and is not consistently domain-specific (operations and algebraic thinking, numbers and operations—fractions, measurement and data, and geometry).	75
	• Teacher implementation of effective instructional strategies to improve pedagogy and impact student learning should occur daily.	56
	• The most important aspect of feedback in mathematics is to provide opportunities for instructional advancement in teaching intermediate mathematics.	38
	• Feedback in intermediate mathematics should lead to higher levels of domain-specific (operations and algebraic thinking, numbers and operations—fractions, measurement and data, and geometry) practice and pedagogy.	38
RQ2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?	• An important characteristic of instructional leadership is to ensure leaders and teachers, new and veteran, stay current with the most up-to-date practices in teaching intermediate mathematics by providing relevant and applicable feedback.	100
	• The most effective way of delivering feedback for teaching and learning in the intermediate mathematics classroom is with evidence and suggestions for activities noted by school leaders as a result of regular classroom walkthroughs.	100

Results

Three themes emerged from the data analysis process. The following sections present the themes and evidence from the data analysis to support the themes. The emergent themes included: the influence of feedback in mathematics on classroom instruction, the difference content expertise makes in the relevance of feedback, and the relationship between building capacity in a content area and instructional leadership practices (see Figure 2).

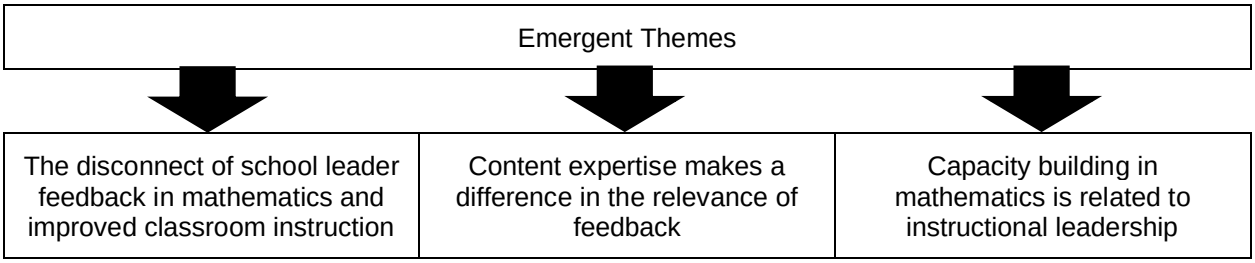


Figure 2. Emergent themes.

Overwhelmingly, school leaders and teachers agreed feedback in intermediate mathematics instruction promoted growth in teacher pedagogy. Teacher responses to the questionnaire were most significant in noting how school leader feedback aligned with the curriculum, standards, student data, best practices, and the standards for mathematics teaching practices. School leader expertise in mathematics was evident as a significant factor in how feedback was delivered and the relevance of how feedback was applied in the intermediate mathematics classroom. School leaders cited time as a major factor in preventing the pursuit of professional development in specific content areas such as mathematics.

Theme 1

Theme 1 was perceptive disconnect of feedback between school leaders, teachers, and classroom application. One hundred percent of the 13 teacher participants identified a disconnect between the influence of school leader feedback in mathematics and improved classroom instruction. Teacher participants noted performance feedback in mathematics was mostly given through verbal or written feedback but with minimal connection to the knowledge of content and pedagogy or best practices. The three school leader participants believed feedback in intermediate mathematics was sufficient to influence improved classroom instruction. Data analysis of all 16 participant responses illuminated a clear disconnect in teacher beliefs and school leader beliefs in how influential feedback was in the mathematics classroom.

Teacher participants distinguished school leaders often provided a short description or checklist of what was observed during a classroom visit. One teacher stated, “School leaders give some suggestions and sometimes offer positive aspects of what was observed [in mathematics] . . . but I feel like the feedback can be extremely outdated and mundane” (Teacher 4). Teacher 2 noted, “Suggestions for strategies in mathematics did not align with the needs of my students and did not offer any benefit to improved classroom instruction.” Contrarily, the school leader perspective offered divergent viewpoints.

“As a school leader, I provide teachers with the feedback they need for improved classroom practice in math. Feedback is always timely and specific, and I try to focus on one or two areas for improvement” (School Leader 1). In interview and questionnaire responses, school leaders expressed a common desire to see teachers grow in content knowledge and expertise in mathematics. School Leader 3 stated,

> It is hard to have tough conversations with teachers about classroom instruction, but then I ask myself if I would place my children in a particular classroom, and I know I have to give valid and discerning feedback that will help teachers improve pedagogical practice in math.

Other responses from school leaders suggested teachers were applying and using feedback to guide classroom practice, but implied was the perception school leaders may be assuming teachers are applying feedback in the classroom. In their responses, the school leaders provided no specific description of why they believed feedback influenced instructional practices in mathematics.

The collective narratives of teachers and school leaders indicated a disconnect between how school leaders believed feedback was disseminated in intermediate mathematics and how

teachers perceived feedback to be disseminated in mathematics. Most teachers indicated they received generalized feedback from school leaders, which did not help improve instructional practices in mathematics. As Teacher 13 stated, "What I need is coaching and mentoring on the planning and delivery of the math content, but what I get is generalized information about the math lesson."

Theme 2

Theme 2 was content expertise makes a difference in the relevance of feedback. Nearly all teachers reported instructional practices are influenced by relevant content-area expertise. Teacher responses to the questionnaire and interview questions converged on the idea teachers should be masters of grade-level content and school leaders should provide the means and ways for developing content expertise. For teachers to properly reflect and apply related content feedback in the classroom environment, school leaders should be the epitome of knowledge, influence, and expertise (Lochmiller, 2016). Teacher 10 stated,

> Feedback is effective when it is framed positively and as constructive as possible. To me, that includes solutions that are practical and realistic and will benefit my teaching practices and the students. Feedback is ineffective when it does not align with the dynamic of the classroom or the needs of specific students.

The implication is Teacher 10's quote demonstrates a clear distinction between the relevance of school leader feedback in mathematics and teacher perception of feedback effectiveness. Teachers expressed the need for feedback to be related to a specific content area to be able to incorporate the feedback into current and future instructional practices. Fundamentally, teachers described the influence content expertise of school leaders had on instructional feedback. Teacher 8 stated,

> Great feedback from school leaders has the potential to help me frame the breakdown of how I teach math. I need my administrators to provide me expert feedback in content areas, and especially with difficult content areas such as [intermediate] mathematics.

School leaders had difficulty giving specific examples of how teachers could improve pedagogical knowledge of intermediate mathematics but were able to describe the different ways in which they provided feedback to teachers. Vague responses to questions regarding content expertise in mathematics offered an implicit view of how perceptions of content expertise make a difference in how teachers apply feedback received from performance evaluations. One teacher's interview response indicated the biggest weakness experienced while working with school leaders was the inability of school leaders to offer relevant and content-driven feedback.

The idea of content expertise can be connected to many different facets of the elementary school leader. For one, school leaders expressed how difficult learning all aspects of content areas can be, such as the exceptional student education program, the gifted program, and running the school. Teacher 1 explained why the perception of school leader expertise is critical to teachers:

> I believe school leaders have the responsibility to facilitate teacher knowledge and develop content expertise in the staff. Compared to other states, most administrators here [Florida] appeared to have left the classroom at an early stage in their teaching career. This leads me to believe school leaders have limited experience with teaching mathematics, and the source of feedback is coming from someone who has not had new experiences with the math curriculum . . . or with mathematical practices.

Theme 3

Theme 3 was capacity building in mathematics is related to instructional leadership. From the information gathered from the 13 teachers and three school leaders, feedback practices in mathematics failed to address the quality of instruction, hence reducing teachers' attempts to apply feedback in the mathematics classrooms. Teachers expressed the belief school leaders played an important part in transforming feedback practices as the means for elevating teacher knowledge in best practices for teaching mathematics. Capacity building may be associated with teacher self-efficacy and the ability of school leaders to build teacher efficacy by providing specific instructional coaching in mathematics content.

Teacher 5 stated, "Feedback practices should include the opportunities for teachers to learn how to improve instructional strategies and curriculum implementation in the classroom." Instructional leaders tend to differentiate feedback, provide reflective opportunities, and express interest in improving instruction. Teachers expressed capacity building in alignment with constructive feedback and described the belief feedback should target needs relevant to specific individuals and students in the mathematics classroom. Teacher 9 stated,

> I always appreciated the feedback I received from my math coach. She offered me great feedback by detailing specific strategies and ways to incorporate new ideas into my mathematics teaching. She . . . provided excerpts from a math program, allowing me to grow my knowledge of mathematics and try new activities with my students. We always met before and afterward, in a coaching cycle, to make sure everything we were working on made sense and applied to my students. During our post activity conversation, we sorted the students into differentiated categories. This kind of coaching and feedback

> helped me help my students and made me feel as though I was on the right track with teaching mathematics.

Teacher 9's scenario was indicative of a coaching cycle implemented by an instructional leader when working with staff to build knowledge and capacity in mathematics. Presumably, implementing the coaching cycle with fidelity takes time. School leaders noted the desire to be instructional leaders but indicated the difficulty in committing time to instructional practices when many other tasks need to be completed throughout a school day. Not taking the time necessary for increasing the capacity of mathematics performance in the classroom may result in decreased teacher skills in a specific content area.

Reliability and Validity

Reliability and validity were the cornerstones for the findings from the research study. Credibility, transferability, dependability, and confirmability of the research were examined through attention to data collection, analysis, interpretation, and reporting of the results (Creswell & Creswell, 2018; Patton, 2015; Yin, 2018). The first step in ensuring the study was reliable and valid was in the field testing of the open- and closed-ended questionnaire and interview questions (Yin, 2016, 2018). Infield testing the questionnaire and interview questions led to modifications based on subject-matter expert recommendations, and more qualified questions were presented to study participants. The field test participants were not included in the final summation of study data, analysis, or results.

Credibility was established by using multiple sources of data collection from Grade 3–5 teachers and school leaders who provided ongoing feedback in the intermediate mathematics classroom. Participant perspectives included a rich description and interpretation of information and ideas (Creswell, 2016). Multiple data points provided the ability to verify, compare, and

categorize the experiences and perceptions of the participants. Three sources of data collection—open-ended questionnaires, closed-ended questionnaires, and interviews—were used to support the triangulation of data and allowed for accurate interpretations of the data collected (Yin, 2016).

Transferability was confirmed with the use of thick and rich descriptions of the participant responses, events, and collection of information from multiple research participants (Creswell, 2016). Confirmability was designated with the acknowledgment of assumptions and latent influences on the outcomes of the study. Researcher reflexivity was achieved by keeping track of assumptions, reactions, and opinions in a journal and by remaining objective and unbiased in the description of the study findings (Creswell & Creswell, 2018; Patton, 2015; Yin, 2018).

Chapter Summary

The perspectives of 16 participants—13 teachers and three school leaders—regarding school leader expertise on intermediate mathematical pedagogy were described. Demographic information about participants and data collection and analysis methods were included in Table 2 and represented varying levels of experience. Information gathered from participants included responses to semi-structured interviews and open- and closed-ended questionnaires. Data analysis incorporated Creswell's (2016) framework for initial review of data, compiling data in codes and themes, and axial analysis to determine more specific and interconnected ideas.

Three themes were identified as the overarching findings from the research study. Themes which emerged from data analysis were supported with participant quotes from semi-structured interviews and open- and closed-ended questionnaires. Reliability and validity were

discussed, and a description of credibility, transferability, dependability, and confirmability of the research was provided.

The following sections provide further interpretation of the findings from data collection and analysis. Findings, interpretations, and conclusions of the investigation are discussed. The limitations and implications of the study are highlighted, and the conclusion provides recommendations for further research of the relevance of school leader expertise and intermediate mathematics.

Chapter 5: Discussions and Conclusions

School leaders hold levels of expertise in varying aspects of school functionality. Existing literature indicates a significant gap in defining and determining how the expertise of school leaders influences the perspectives of intermediate mathematics teachers on classroom pedagogy. The purpose of the qualitative exploratory case study was to investigate elementary teacher and school leader perceptions of content-specific feedback on teacher pedagogy in intermediate mathematics classrooms in Florida. The investigation was conducted to explore the perceptions of school leaders and teachers to contribute information to further develop insight into practices for improving intermediate mathematics pedagogy. The investigation focused on gaining insight into the following research questions:

> Research Question 1: How do teachers in an elementary school in Florida describe the importance of receiving relevant content feedback in mathematics from school leaders?
>
> Research Question 2: How do instructional leaders in an elementary school in Florida describe the importance of pragmatic feedback versus content-specific strategies on intermediate teachers of mathematics?

The research design encompassed a qualitative exploratory case study. Data collection included the use of face-to-face and virtual semi-structured interviews and electronically disseminated open- and closed-ended questionnaires. Data revealed participant perspectives on administrative expertise and feedback depended on the relevance of content-specific feedback and how the feedback was presented by the instructional leader. Some disconnect in perspective was revealed when responses from teachers and school leaders were examined concerning the influence of school leader feedback in mathematics and improved classroom instruction.

Following are the research findings, interpretations, conclusions, limitations, recommendations, implications for leadership, and conclusion.

Findings, Interpretations, Conclusions

The model for the qualitative exploratory case study was the theoretical framework. The theoretical framework for the research was based on two versions of the constructivist theory for learning new information and the alignment of leader practices with the instructional leadership theory. Data collected were explored and interpreted through the context of the constructivist and instructional leader theories. The constructivist theory associated the process of receiving feedback as a spiraled approach to acquiring, constructing, and integrating new learning in a specific content area. As an approach, constructivist feedback from school leaders may encourage teachers to use newly gained feedback to build on expertise in a particular field.

Collectively, the supplementary lens of constructivism combined with instructional leadership theory implied feedback from school leaders influences depth, complexity, and administrative expertise for increasing teacher expertise and enhanced content pedagogy. The theoretical framework was applied to establish the research methodology parallel with the elimination of ancillary information which did not contribute value or a rich understanding of the topic. Semi-structured interviews and open- and closed-ended questionnaire responses were explored, coded, categorized, and analyzed. Similarities in commentary and described events were used to identify three themes relevant to interpreting information for the research questions.

In education, feedback in intermediate mathematics can build a teacher's capacity to improve content and pedagogical knowledge (Ingersoll et al., 2018; Lochmiller, 2016; Vogel, 2018). Awareness of feedback practices may be considered a constructive process used to develop an individual's ability to construct new knowledge about a content area. Analogous to

middle and high schools, elementary school teachers and school leaders interact in various ways (Ghavifekr et al., 2019). Although teachers and school leaders may have a variety of discussions related to classroom instruction, many do not involve specific content-based feedback meant to improve pedagogical skills. The practical application of the feedback in the classroom is strengthened when quality feedback is determined by the extent of school leader expertise in a content area (Mireles-Rios & Becchio, 2018; Rigby et al., 2017; Telio et al., 2016). Establishing school leader expertise through teacher construction of ideas and information provided to teachers in feedback can best be aligned with instructional leader practices (Plaatjies, 2019). Teachers perceived school leader expertise encouraged teachers to apply feedback in the mathematics classroom and reinforced the leader's ability to build capacity in a specific content area (Lochmiller, 2016).

Effective instructional leaders have expert knowledge and seek to build content expertise based on the standards, curriculum, and best practices for mathematics teaching (Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017; Telio et al., 2016; Vogel, 2018). Teacher interview responses indicated the importance of teachers receiving effective mathematical feedback from school leaders. Participant perspectives offered insight into how specific strategies, information from the curriculum, and best practices in math pedagogy should be integrated into mathematical feedback practices. The themes which emerged from coding the teacher and school leader semi-structured interview responses indicated the importance of school leader feedback practice, building content knowledge, and the call to instructional leadership (Zahed-Babelon et al., 2019). Teachers expressed the need to experience engagement with the feedback process by accumulating various aspects of intermediate mathematics through the expertise of school leaders.

School leaders emphasized feedback in the mathematics classroom was intended to create opportunities for teachers to build and apply knowledge. While teachers and school leaders agreed the main objective of feedback in intermediate mathematics is teacher growth, teachers qualified school leader feedback as being mostly general to the content-area curriculum. Analysis of the data indicated teachers desired and valued the feedback received from school leaders but would like school leaders to offer specific, standards-based information which improves teacher pedagogy.

From the research, clarity for the value of feedback and the fortitude for school leaders to use feedback to build content capacity was provided through both school leader and teacher perceptions. Some of the teachers with 20+ years of experience indicated school leader feedback offered no value on instructional practices in mathematics, while teachers with less experience expressed the desire for any curricular feedback. The difference in the perspectives supported the indication of varied school leader expertise evident in mathematical feedback. From the teachers' perspectives, school leaders tended to give less specific feedback to teachers who were perceived to have master teaching experience and tended to give more focused feedback to teachers who had less experience or needed more support. The perspectives of teachers captured during the semi-structured interviews and open- and closed-ended questionnaires suggested the value of feedback from one teacher to the next depended on how much the school leader knew about a particular topic in mathematics. Conversely, how teachers applied feedback in the intermediate mathematics classroom was also principally contingent upon how teachers perceived the role of the school leaders.

School leaders and teachers alike made the distinction between the collection of informal evidence and formal evaluation-based evidence for mathematics feedback. Both sets of

participants described informal feedback as being less descriptive and helpful than formal feedback. Respectively, teachers expressed equal importance of formal and informal feedback practices. Teacher perception of school leader roles aligned with the methods of how feedback was disseminated in intermediate mathematics. Teachers described how school leaders conducted mathematics walkthroughs to informally collect information about the classroom environment, instruction, classroom management, and classroom culture. School leaders would exit the room after leaving a brief note or checklist of what was observed. Although informal feedback appeared to be perceived as valuable, data from teacher perspectives supported the aspiration to have a more specific connection between mathematics content and curriculum than an unexacting and generalized checklist. Implicit in the teachers' responses was the desire for expert support in understanding if the mathematics curriculum was being perpetuated rigorously during mathematics instruction.

Limitations

Limitations in qualitative exploratory case studies include the challenge of generalizing results to the wider population and scope and time necessary to complete the investigation (Creswell & Creswell, 2018; Theofanidis & Fountouki, 2018). The study was limited to one suburban Florida elementary school and the 16 participants who provided informed consent to participate in the research. Transferability to the broader populace can be difficult in qualitative studies, but transferability was sustained through rich and detailed participant perspectives, the contextual relevance to the research questions, and conclusions drawn from the data collected (Creswell & Creswell, 2018). Even so, the research findings may not be transferable to intermediate elementary mathematics teachers across different settings.

Credibility was established through the confidence in the data collected and the reflection of the rich and aligned perspectives of the participants provided in the findings and discussion (Creswell & Creswell, 2018). As an established member of the Florida elementary school under study, researcher bias was limited by reflexively journaling subjective thoughts, ideas, and preconceived notions about the research topic. Triangulation of the data occurred through extensive collections of participant perspectives using semi-structured interviews and open- and closed-ended questionnaires.

In qualitative research, dependability is described as the consistency and constancy of the data collected over time and circumstances (Creswell & Creswell, 2018). Dependability of the research was ensured through rich capture of participant perspectives, transcribed notes, description of the research design, and consistently coding the data for redundancy and extraneous information (Creswell & Creswell, 2018). A closed-ended questionnaire was used to supplement and support the perspectives gathered through the open-ended questionnaire and to provide further context to the semi-structured interview responses.

Due to participant time constraints during the data collection process, semi-structured interviews lasted only 25 to 30 minutes. The short time inhibited the opportunity for additional probes and further dissection of the interviewees' thoughts and ideas relevant to mathematical feedback. As a result, the findings from the research study modestly touched on the perceptions of school leader expertise and feedback in the intermediate mathematics classroom. For instance, the findings revealed teachers placed value on feedback from school leaders but desired the feedback to be more specific to the intermediate mathematical standards and curriculum. The study did not deeply explore the types of or methods for giving feedback in intermediate mathematics.

School leader feedback and instructional leadership are far-reaching concepts (Plaatjies, 2019). The research study did not address all aspects of feedback in intermediate mathematics, nor did the study explore perspectives of teachers outside the field of intermediate mathematics teaching. Furthermore, in instructional settings such as elementary schools, feedback can be delivered by sources other than the school leaders (Plaatjies, 2019). The research was limited to the discovery of perspectives aligned solely with feedback given to teachers by school leaders.

Recommendations

The exploratory case study examined the perceptions of school leaders and teachers regarding the influence of school leader expertise on intermediate mathematical feedback. The ability of school leaders to increase teacher knowledge and improve pedagogy in intermediate mathematics requires school leaders to take the role of an instructional leader (Ali, 2017; Austin et al., 2018; Bellibas & Liu, 2017; Ismail et al., 2018). School leader expert knowledge in mathematics combined with instructional leadership demonstrates enhanced decision making and instructional feedback (Lochmiller, 2016; Rigby et al., 2017). Due to the influence school leaders can have on teacher pedagogy, school leaders should consider increasing leader skills in the distinct areas of instructional leadership, intermediate mathematics, and delivery of feedback.

Findings from a study by Zahed-Babelon et al. (2019) revealed teachers perceived instructional leadership and content knowledge as interconnected processes aligned with leader expertise. School leaders who worked to enhance instructional leader skills in a continuous improvement cycle promoted greater teacher efficacy and development (Bellibas & Liu, 2017). As noted in the discussion, instructional leader skills combined with the application of a constructivist approach toward giving specific feedback in a content area can influence teacher pedagogy (Clark, 2018; Fernando & Marikar, 2017; Sebastian et al., 2016). School leaders are

accountable for the success of teachers in the school building (Rigby et al., 2017). By increasing understanding of the intermediate mathematics content, school leaders can perpetuate quality feedback to instructors (Fernando & Marikar, 2017).

To increase and update intermediate mathematical content knowledge, school leaders can first participate in a variety of professional learning. For example, school leaders can consider taking the same mathematics training as teachers. Teachers who witnessed school leaders' interest in building capacity in the content area found more value in participating in the training and activities (Walter, 2019). Secondly, school leaders may consider spending nonevaluative quality time in the classrooms of highly effective mathematics teachers, noting best practices and specifics of teacher content knowledge. The practice of spending time in classrooms can perpetuate a learning culture rich in descriptive feedback and teacher learning (Wallin et al., 2019).

Third, establishing a group of highly recognized math support personnel can assist school leaders in recognizing best practices and helping teachers improve math pedagogy (Rigby et al., 2017). School leaders acknowledged time as a mitigating factor in the prevention of quality mathematical feedback. A group of people whose sole focus is advancing mathematical content knowledge may help increase the school leaders' instructional capabilities. School leaders recognized the importance of understanding the essential knowledge and skills to impart effective feedback in intermediate mathematics (Lochmiller, 2016). The results of the study revealed school leaders may consider cyclical development in the capacity for instructional leadership practices.

Implications for Leadership

The results of the study highlighted various perspectives and contexts of how teachers and school leaders perceived the relevancy of mathematics feedback in the intermediate mathematics classroom. The data collected from teacher interviews and questionnaires suggested school leaders delivered feedback in the intermediate mathematics classroom in a general and nonspecific fashion. As the complexity of school leadership has evolved into the drive for school improvement, 100% graduation rates, and increased professional learning in content-based classes, school leaders cannot afford to ignore means and ways to develop expertise in the mathematics classroom (Lochmiller, 2016; Rigby et al., 2017). Successful school leader development has not been accidental, coincidental, or unrefined (Ghavifekr et al., 2019). Instead, school leadership and expertise were often designed as envisaged development of talent, content knowledge, and instructional leader skills (Ghavifekr et al., 2019). The results of the study provided insight into the implication for the role of instructional leaders and developing specific content-based knowledge for the purpose of improving intermediate feedback policy and practice.

School leaders who take the time to develop deep content knowledge in intermediate mathematics may be able to be direct role models for matters concerning mathematical pedagogy and curriculum. As teachers perceive school leaders in the role of the expert, the conveyance of mathematical knowledge through feedback may increase teacher confidence in the school leader's capacity to deliver relevant and applicable classroom information. When teachers deduced and identified the school leader as an instructional leader with knowledge beyond the day-to-day operations of the school, teacher motivation to improve classroom instruction increased (Donahue & Vogel, 2018; Rigby et al., 2017).

Aligned with developing leader knowledge in a specific content area is the development in the policy of quality feedback. School leaders are expected to fully support classroom instruction with expertise in a plethora of content areas (Rigby et al., 2017). Whether teachers are considered veteran or novice, the school leader is expected to take on the instructional leader role and deliver differentiated but substantial feedback for all (Donahue & Vogel, 2018; Rigby et al., 2017). Supplementary leader command of the intermediate math standards, best practices for instructional pedagogy, and curriculum may increase the significance of the impact of mathematics feedback on intermediate mathematics teacher application. The practice of school leaders who fully integrated knowledge and expertise with content-area feedback avoided the bias school leaders can have about classroom instruction and promoted teacher pedagogy beyond basic teaching practices (Furner & Higgins, 2019; Ghavifekr et al., 2019).

Conclusion

The objective of the qualitative exploratory case study was to assess the perspectives of school leaders and teachers on mathematical content expertise. The research methodology was guided by the research questions, and the analysis of semi-structured interview and open- and closed-ended questionnaire responses led to the emergence of three themes. The study contributed to the validation of instructional leadership practices and how teachers perceive the influence of school leader expertise in intermediate mathematics. Limitations of the study were discussed and emphasized possible future research topics.

Academically, the results of the study provide a greater understanding of the differences and variability in the feedback practices of school leaders. Many factors, such as time, can influence how feedback is initiated and delivered in the intermediate mathematics classroom. School leader perspectives and teacher perspectives aligned concerning the intent of feedback

practices, but differed in framing the belief in the quality, expertise, and application of the feedback. The capacity for a school leader to transition to an instructional leader can be impacted by the leader's pedagogical expertise and content knowledge (Ingersoll et al., 2018; Lochmiller, 2016; Mireles-Rios & Becchio, 2018; Rigby et al., 2017; Telio et al., 2016; Vogel, 2018). The effectiveness of classroom instruction may be improved if the school leader were disposed to acknowledge the necessity of professional learning and deep immersion with specific content and pedagogical best practices in mathematics. Instructional leadership requires leaders who are acutely aware of broadening knowledge in a specific content area and who are agreeable to be the model of content expertise and classroom application (Lochmiller, 2016).

References

Ali, N. (2017). Teachers' perceptions of the relationship between principals' instructional leadership, school culture, and school effectiveness in Pakistan. *Education & Science, 42*(192), 407–425. doi:10.15390/EB.2017.7088

Altan, S., Lane, J. F., & Dottin, E. (2019). Using habits of mind, intelligent behaviors, and educational theories to create a conceptual framework for developing effective teaching dispositions. *Journal of Teacher Education, 70*(2), 169–183. doi:10.1177 /0022487117736024

Austin, S., Anderson-Davis, D., Graham, J., & White, M. (2018). Instructional leadership teams to the rescue: Developing a shared vision is key to success. *Principal Leadership, 19*(1), 40–43. Retrieved from https://www.nassp.org

Bass, B. M. (1985). *Leadership and performance beyond expectations.* New York, NY: Free Press.

Bellibas, M. S., & Liu, Y. (2017). A multilevel analysis of the relationship between principals' perceived practices of instructional leadership and teachers' self-efficacy perceptions. *Journal of Educational Administration, 55*(1), 49–69. doi:10.1108/JEA-12-2015-0116

Benoliel, P., & Schechter, C. (2017). Is it personal? Teacher's personality and the principal's role in professional learning communities. *Improving Schools, 20*(3), 222–235. doi:10.1177 /1365480217703725

Bernard, H. R. (2017). *Research methods in anthropology: Qualitative and quantitative approaches.* Lanham, MD: Rowman & Littlefield.

Boberg, J. E., & Bourgeois, S. J. (2016). The effects of integrated transformational leadership on achievement. *Journal of Educational Administration, 54*(3), 357–374. doi.org/10.1108/JEA-07-2014-0086

Brauckmann, S. S. B., Geibler, G., Feldhoff, T., & Pashiardis, P. (2016). Instructional leadership in Germany: An evolutionary perspective. *International Studies in Educational Administration, 44*(2), 5–20. Retrieved from https://www.cceam.org

Burns, J. M. (1978). *Leadership.* New York, NY: Harper & Row.

Chenoweth, K. (2016). ESSA offers changes that can continue learning gains. *Phi Delta Kappan, 97*(8), 38–42. doi:10.1177/0031721716647017

Clark, K. R. (2018). Learning theories: Constructivism. *Radiologic Technology, 90*(2), 180–182. Retrieved from https://www.asrt.org

Cogaltay, N., Yalcin, M., & Karadag, E. (2016). Educational leadership and job satisfaction of teachers: A meta-analysis study on the studies published between 2000 and 2016 in Turkey. *Eurasian Journal of Educational Research, 62*(2016), 255–282. doi:10.14689/ejer.2016.62.13

Creswell, J. W. (2016). *30 essential skills for the qualitative researcher.* Los Angeles, CA: Sage.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Los Angeles, CA: Sage.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process.* Boston, MA: Heath.

Dewey, J. (1986). Experience and education. *The Educational Forum, 50*(3), 241–252. doi:10.1080/00131728609335764

D'Innocenzo, L., Mathieu, J. E., & Kukenberger, M. R. (2016). A meta-analysis of different forms of shared leadership–TAM performance relations. *Journal of Management, 42*(7), 1964–1991. doi:10.1177/0149206314525205

Donahue, E., & Vogel, L. R. (2018). Teacher perceptions of the impact of an evaluation system on classroom instructional practices. *Journal of School Leadership, 28*(1), 31–55. doi:10 .1177/105268461802800102

Elgart, M. A. (2016). Creating state accountability systems that help schools improve. *Phi Delta Kappan, 98*(1), 26–30. doi:10.1177/0031721716666050

Eun, B. (2019). Two diverging paths toward a common destination: The dialogism of Vygotsky and Bakhtin. *Culture & Psychology, 25*(4), 484–502. doi:10.1177/1354067X18820635

Fernando, S. Y. J. N., & Marikar, F. M. M. T. (2017). Constructivist teaching/learning theory and participatory teaching methods. *Journal of Curriculum and Teaching, 6*(1), 110–122. Retrieved from http://www.sciedupress.com

Florida Department of Education. (2019). *PK–12 public school data publications and reports.* Retrieved from https://www.fldoe.org

Furner, J. M., & Higgins, C. (2019). Empowering teacher leadership to address math anxiety in today's schools. *Transformations, 5*(1), 4–23. Retrieved from https://nsuworks.nova.edu

Ghavifekr, S., Radwan, O., & Velarde, J. M. (2019). Teachers' perceptions of principals' instructional leadership roles and practices. *Malaysian Journal of Education, 44*(2), 72–83. doi:10.17576/JPEN-2019-44.02-08

Hattie, J. (2015). High-impact leadership. *Educational Leadership, 72*(5), 36–40. Retrieved from https://www.ascd.org

Ingersoll, R. M., Sirinides, P., & Dougherty, P. (2018). Leadership matters: Teachers' roles in school decision making and school performance. *American Educator, 42*(1), 13–17. Retrieved from https://www.newteachercenter.org

Ismail, S., Don, Y., Husin, F., & Khalid, R. (2018). Instructional leadership and teachers' functional competency across the 21st century learning. *International Journal of Instruction, 11*(3), 135–152. doi:10.12973/iji.2018.11310a

Ivie, S. D. (2017). Metaphor, paradigm, and education. *McGill Journal of Education, 52*(1), 33–51. doi:10.7202/1040803ar

Kouzes, J., & Posner, B. (2016). *Learning leadership: The five fundamentals of becoming an exemplary leader.* San Francisco, CA: Wiley.

Kraft, M. A., & Gilmour, A. F. (2016). Can principals promote teacher development as evaluators? A case study of principals' views and experiences. *Educational Administration Quarterly, 52*(5), 711–753. doi:10.1177/0013161X16653445

Kraft, M. A., & Gilmour, A. F. (2017). Revisiting the widget effect: Teacher evaluation reforms and the distribution of teacher effectiveness. *Educational Researcher, 46*(5), 234–249. doi:10.3102/0013189X17718797

Lavigne, A. L., & Chamberlain, R. W. (2017). Teacher evaluation in Illinois: School leaders' perceptions and practices. *Educational Assessment, Evaluation and Accountability, 29*(2), 179–209. doi:10.1007/s11092-016-9250-0

Lochmiller, C. R. (2016). Examining administrators' instructional feedback to high school math and science teachers. *Educational Administration Quarterly, 52*(1), 75–109. doi:10.1177/0013161X15616660

Luffarelli, J., Goncalves, D., & Stamatogiannakis, A. (2016). When feedback interventions backfire: Why higher performance feedback may result in lower self-perceived competence and satisfaction with performance. *Human Resource Management, 55*(4), 591–614. doi:10.1002/hrm.21739

Marques de Lima Rua, O. M. M., & Costa Araujo, J. M. (2016). Linking transformational leadership and organizational trust: Has organizational commitment a mediating effect on it? *Cuadernos de Gestion, 16*(1), 43–62. doi:10.5295/cdg.140484om

McCarley, T. A., Peters, M. L., & Decman, J. M. (2016). Transformational leadership related to school climate: A multi-level analysis. *Educational Management Administration & Leadership, 44*(2), 322–342. doi:10.1177/1741143214549966

Mireles-Rios, R., & Becchio, J. A. (2018). The evaluation process, administrator feedback, and teacher self-efficacy. *Journal of School Leadership, 28*(4), 462–487. doi:10.1177 /105268461802800402

Mitchell, R. M. (2019). Enabling school structure & transformational school leadership: Promoting increased organizational citizenship and professional teacher behavior. *Leadership & Policy in Schools, 18*(4), 614–627. doi:10.1080/15700763.2018.1475577

Neumerski, C. M., Grissom, J. A., Goldring, E., Drake, T. A., Rubin, M., Cannata, M., & Schuermann, P. (2018). Restructuring instructional leadership: How multiple-measure teacher evaluation systems are redefining the role of the school principal. *The Elementary School Journal, 119*(2), 270–297. doi:10.1086/700597

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Thousand Oaks, CA: Sage.

Piaget, J. (1953). *Origins of intelligence in the child.* London, England: Routledge & Kegan Paul.

Plaatjies, B. (2019). Investigating principal capacity in literacy instructional leadership at selected primary schools. *Journal of Social Studies Education Research, 10*(3), 136–160. Retrieved from https://www.jsser.org

Reid, D. B. (2020). School principals acting as middle leaders implementing new teacher evaluation systems. *School Leadership & Management, 40*(1), 88–104. doi:10.1080/13632434.2018.1508013

Rigby, J. G., Larbi-Cherif, A., Rosenquist, B. A., Sharpe, C. J., Cobb, P., & Smith, T. (2017). Administrator observation and feedback: Does it lead toward improvement in inquiry-oriented math instruction? *Educational Administration Quarterly, 53*(3), 475–516. doi:10.1177/0013161X16687006

Sebastian, J., Allensworth, E., & Huang, H. (2016). The role of teacher leadership in how principals influence classroom instruction and student learning. *American Journal of Education, 123*(1), 69–108. doi:10.1086/688169

Sparks, S. D. (2018, January 5). *How feedback for teachers and principals helped their students do better in math.* Retrieved from https://www.edweek.org

Swift, V., & Peterson, J. B. (2018). Improving the effectiveness of performance feedback by considering personality traits and task demands. *PLOS ONE, 13*(5), 1–18. doi:10.1371/journal.pone.01978810

Tangen, R. (2014). Balancing ethics and quality in educational research—The ethical matrix method. *Scandinavian Journal of Educational Research, 58*(6), 678–694. doi:10.1080/00313831.2013.821089

Telio, S., Regehr, G., & Ajjawi, R. (2016). Feedback and the educational alliance: Examining credibility judgements and their consequences. *Medical Education, 50*(9), 933–942. doi: 10.1111/medu.13063

Theofanidis, D., & Fountouki, A. (2018). Limitations and delimitations in the research process. *Perioperative Nursing, 7*(3), 155–163. doi:10.5281/zenodo.2552022

U.S. Department of Education. (2016). *Every Student Succeeds Act (ESSA).* Retrieved from http://www.ed.gov

U.S. Department of Education. (2019). *Every Student Succeeds Act.* Retrieved from https://www .ed.gov

U.S. Department of Health and Human Services. (2018). *Code of federal regulations.* Retrieved from https://www.hhs.gov

Vogel, L. R. (2018). Learning outside the classroom: How principals define and prepare to be instructional leaders. *Education Research International, 2018,* 1–14. doi:10.1155/2018 /8034270

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wallace Foundation. (2016). *School leadership interventions under the Every Student Succeeds Act: Evidence review.* Retrieved from https://www.wallacefoundation.org

Wallin, D., Newton, P., Jutras, M., & Adilman, J. (2019). I am not where I want to be: Teaching principals' instructional leadership practices. *The Rural Educator, 40*(2), 23–32. doi:10 .35608/ruraled.v40i2.777

Walter, P. (2019). Innovations in teaching adult education: Living history museums and transformative learning in the university classroom. *Adult Learning, 30*(3), 121–127. doi: 10.1177/1045159519826074

Wester, K. L. (2011). Publishing ethical research: A step-by-step overview. *Journal of Counseling and Development, 89*(3), 301–307. Retrieved from https://libres.uncg.edu

Wolgemuth, J. R., Hicks, T., & Agosto, V. (2017). Unpacking assumptions in research synthesis: A critical construct synthesis approach. *Educational Researcher, 46*(3), 131–139. doi:10 .3102/0013189X17703946

Yin, R. K. (2016). *Qualitative research from start to finish* (2nd ed.). New York, NY: Guilford Press.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Thousand Oaks, CA: Sage.

Zahed-Babelon, A., Koutlaei, G., Moeinikia, M., & Sharif, A. R. (2019). Instructional leadership effects on teachers' work engagement: Roles of school culture, empowerment, and job characteristics. *CEPS Journal, 9*(3), 137–156. doi:10.26529/cepsj.181

Appendix A: District Permission to Conduct Research

Hillsborough County
PUBLIC SCHOOLS
Preparing Students for Life

February 12, 2020

Jennifer Livornese
[redacted]

Dear Jennifer Livornese:

The Hillsborough County Public School district has agreed to participate in your research proposal, *Feedback: An Exploratory Case Study Examining Administrative Expertise on Intermediate Mathematical Pedagogy*. A copy of this letter **MUST** be available to all participants to assure them your research has been approved by the district. **Your approval number is RR1920-46. You must refer to this number in all correspondence**. Approval is given for your research under the following conditions:

1) Participation is to be on a voluntary basis. That is, participation is **NOT MANDATORY**, and you must advise **ALL PARTICIPANTS** that they are not obligated to participate in your study.

2) You must **request approval from this department before other schools are added to your sample.**

3) Confidentiality must be assured for all. That is, **ALL DATA MUST BE AGGREGATED SUCH THAT THE PARTICIPANTS CANNOT BE IDENTIFIED**. Participants include the district, principals, administrators, teachers, support personnel, students and parents.

4) Any data **MUST** be **DESTROYED** when the project has been completed.

5) Since you are an employee of the Hillsborough County Public Schools, all work related to this research **must be done outside your normal working hours** unless your administrator believes the research is a function of your position.

6) If this work is **not part of your job, you cannot use the school mail or email system** to send or receive any documents.

7) Research approval does not constitute the use of the district's equipment, software, email, or district mail service. In addition, requests that result in extra work by the district such as data analysis, programming or assisting with electronic surveys, may have a cost borne by the researcher.

8) This approval **WILL EXPIRE ON 12/30/2020**. You will have to contact us at that time if you feel your research approval should be extended.

9) Prior to presenting your research at any conferences or submitting it to any publications, our office must approve your proposed presentation/publication.

10) A copy of your research findings must be submitted to this department and for our files.

Good luck with your endeavor. If you have any questions, please advise.

Sincerely,

Julie McLeod, Manager
Strategic Data and Evaluation
Office of Strategy Management

JM/sk

Enclosure

cc: Gaye Holt, Principal, Hunters Green Elementary
Amy Zilbar, Executive Leadership Coach, Area VIII District Office

Appendix B: Recruitment Letter

Date:

Dear _____,

I am writing to inform you about an opportunity to participate in a dissertation research study about perceptions of school leader content knowledge and feedback in mathematics. I am a doctoral student at American College of Education. The study was selected because of the need to explore the perceptions of teachers and school leaders regarding content expertise and mathematical feedback. Case studies allow the investigator to perform an in-depth and detailed investigation of a phenomenon, such as perceptions of mathematical feedback from school administrators.

The purpose of the exploratory case study is to investigate elementary teacher and school leader perceptions of content area feedback on teacher pedagogy in the intermediate mathematics classroom. You are being asked to participate because you meet the role of an intermediate teacher of mathematics or a school leader who gives feedback in intermediate mathematics.

As I mentioned, you have been identified as a possible participant for this study. Agreement to be contacted for more information does not obligate you to participate in this study. Your participation in the study is voluntary. If you do not wish to participate, you may withdraw at any time.

I may publish the results of this study; however, I am not going to use your name or share any information you provided. Your information is to remain confidential. If you would like additional information about the study, please call [redacted] or contact Dr. Michelle McCraney, Dissertation Chair, michelle.mccraney@ace.edu.

Thank you again for considering the opportunity to participate in the dissertation research.

With regards,

Jennifer F. Livornese

Doctoral Candidate, American College of Education

Appendix C: Informed Consent

Informed Consent for Participation in Research

Prospective Research Participant: Read this consent form carefully and ask as many questions as you like before you decide whether you want to participate in this research study. You are free to ask questions at any time before, during, or after your participation in this research.

Project Information

Project Title: Feedback: An Exploratory Case Study Examining Administrative Expertise on Intermediate Mathematics Teachers

Researcher: Jennifer F. Livornese

Organization: American College of Education

Email: j[redacted]

Telephone: 727[redacted]

Researcher's Faculty Member: Dr. Michelle McCraney, Ed.D.

Organization and Position: American College of Education, Dissertation Chair

Introduction

I am Jennifer Livornese, and I am a doctoral candidate student at the American College of Education. I am doing research under the guidance and supervision of my Chair, Dr. Michelle McCraney. I may give you some information about the project and invite you to be part of this research. Before you decide, you can talk to anyone you feel comfortable with about the research. This consent form may contain words you do not understand. Please ask me to stop as we go through the information, and I can explain. If you have questions later, you can ask them then.

Purpose of the Research

You are being asked to participate in a research study which may assist with understanding perceptions on mathematical feedback and the influence it has on teacher pedagogy in the intermediate mathematics classroom. This qualitative study may examine how viewpoints, expertise, and feedback practices from school leaders and teachers in the Southwest Florida area influence teacher pedagogy. Through the investigation of school leader feedback, contextual conditions within the study may provide support to the school district in understanding how content knowledge in mathematics is imparted in school leader feedback.

Research Design and Procedures

The study uses an exploratory case study methodology and qualitative research design. Information may be disseminated to participants within a sub-area of a school district in Tampa, FL. The study may comprise of 12 participants, purposively selected, who may participate in interviews and questionnaires. The study may involve face to face and/or virtual interviews to be conducted at the site most convenient for participants. After the study is concluded, a debrief session may occur.

Participant selection

You are being invited to take part in this research because of your experience as an intermediate mathematics teacher or school leader who provides feedback to teachers of intermediate mathematics. You can contribute much to the perceptions of feedback as it relates to intermediate mathematics which meets the criteria for this study. Participant selection criteria: Three intermediate teachers in each grade level, three through five who are responsible for implementing the general education mathematics curriculum, and three school leaders who are responsible for providing feedback in mathematics.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate. If you choose not to participate, there is no punitive repercussions and you do not have to participate. If you select to participate in this study, you may change your mind later and stop participating even if you agreed earlier.

Procedures

We are inviting you to participate in this research study. If you agree, you may be asked to participate in interviews, or answer questionnaire inquiries. Questions asked may range from a demographical perspective to direct inquiries about the topic of intermediate mathematics, content knowledge, and feedback.

Duration

The questionnaire portion of the research study may require approximately 20-30 minutes to complete. If you are selected to participate in an interview, the time expected may be a maximum of 30 minutes. A follow-up debriefing session may take place after the study has been completed for no more than 30 minutes.

Risks

The researcher may ask you to share personal and confidential information, and you may feel uncomfortable talking about some of the topics. You do not have to answer any question or take part in the discussion if you don't wish to do so. You do not have to give any reason for not responding to any question.

Benefits

While there is no direct financial benefit to you, your participation is likely to help us find out more about intermediate mathematics. The potential benefits of this study may aid the school district in the understanding of the influences of feedback on mathematical pedagogy.

Reimbursement
No reimbursement is given for participation in the research.

Confidentiality
I am not going to share information about you or anything you say to anyone outside of the researcher. During the defense of the doctoral dissertation, data collected may be presented to the dissertation committee. The data collected is to be kept in a locked file cabinet or encrypted computer file. Any information about you is coded and does not have a direct correlation, which directly identifies you as the participant. Only I know what your number is, and I am going to secure your information.

Sharing the Results
At the end of the research study, the results may be available for each participant. It is anticipated to publish the results so other interested people may learn from the research.

Right to Refuse or Withdraw
Participation is voluntary. At any time, you wish to end your participation in the research study, you may do so without repercussions.

Questions About the Study
If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact Dr. Michelle McCraney. This research plan has been reviewed and approved by the Institutional Review Board of the American College of Education. This is a committee whose role is to make sure research participants are protected from harm. If you wish to ask questions of this group, email IRB@ace.edu.

Certificate of Consent
I have read the information about this study, or it has been read to me. I acknowledge why I have been asked to be a participant in the research study. I have been provided the opportunity to ask questions about the study, and any questions have been answered to my satisfaction. I certify I am at least 18 years of age. I consent voluntarily to be a participant in this study.

Print or Type Name of Participant: _____

Signature of Participant: _____

Date: _____

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered to the best of my ability. I confirm the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this Consent Form has been provided to the participant.

Print or type name of lead researcher: _____

Signature of lead researcher: _____

I have accurately read or witnessed the accurate reading of the assent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm the individual has freely given assent.

Print or type name of lead researcher: _____

Signature of lead researcher: _____

Date: _____

Signature of faculty member: _____

Date: _____

PLEASE KEEP THIS INFORMED CONSENT FORM FOR YOUR RECORDS.

Appendix D: Subject-Matter Expert Feedback

November 18, 2019

Dear Dr.

My name is Jennifer Livornese and I am a Doctoral Candidate with the American College of Education. My proposed dissertation, *Feedback: An Exploratory Case Study Examining Administrative Expertise on Intermediate Mathematical Pedagogy,* addresses teacher perceptions of domain specific school leader feedback in response to intermediate mathematics pedagogy in Southwest, Florida. I am in the midst of completing chapter three, self-creating, and searching for data collection instruments. As I am sure you are aware, there is a requirement to have self-created instruments reviewed by subject matter experts or to gain permission to use or modify an existing instrument. I respectfully ask for your review, feedback, or guidance for the self-created, brief, and attached interview, observation and questionnaire instruments.

Important Contacts for this study include:

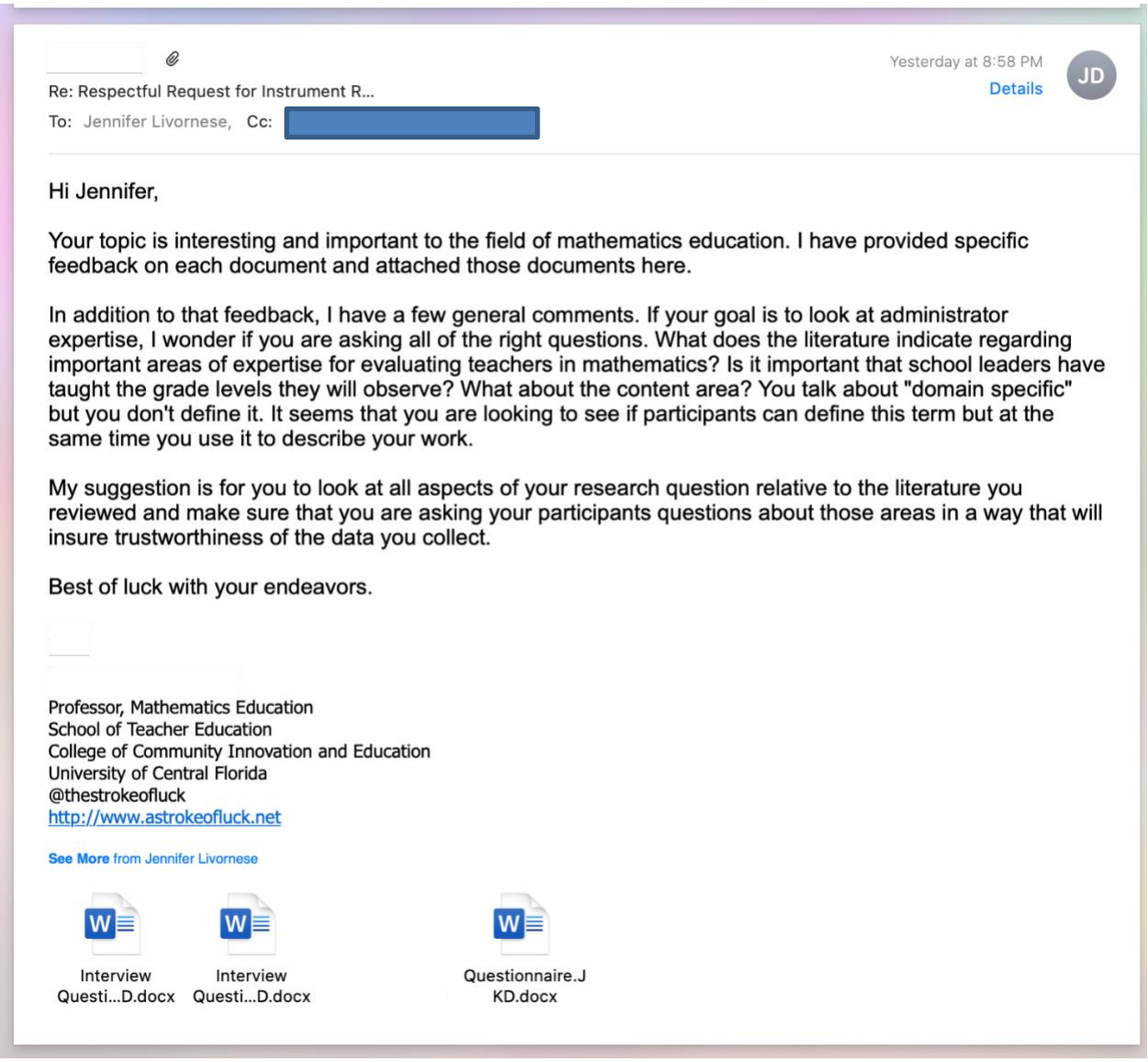
Principal Investigator: Jennifer F. Livornese
E-mail: [redacted]

Dissertation Chair: Dr. Michelle McCraney
E-mail: [redacted]

Thank you for your attention to this issue and response. I appreciate your time and consideration of my request.

With regards,

Jennifer Livornese
ACE Doctoral Candidate



Re: Respectful Request for Instrument R...

Yesterday at 8:58 PM

Details

JD

To: Jennifer Livornese, Cc: [redacted]

Hi Jennifer,

Your topic is interesting and important to the field of mathematics education. I have provided specific feedback on each document and attached those documents here.

In addition to that feedback, I have a few general comments. If your goal is to look at administrator expertise, I wonder if you are asking all of the right questions. What does the literature indicate regarding important areas of expertise for evaluating teachers in mathematics? Is it important that school leaders have taught the grade levels they will observe? What about the content area? You talk about "domain specific" but you don't define it. It seems that you are looking to see if participants can define this term but at the same time you use it to describe your work.

My suggestion is for you to look at all aspects of your research question relative to the literature you reviewed and make sure that you are asking your participants questions about those areas in a way that will insure trustworthiness of the data you collect.

Best of luck with your endeavors.

[redacted]

Professor, Mathematics Education
School of Teacher Education
College of Community Innovation and Education
University of Central Florida
@thestrokeofluck
http://www.astrokeofluck.net

See More from Jennifer Livornese

Interview Questi...D.docx

Interview Questi...D.docx

Questionnaire.J KD.docx

From:
Sent: Tuesday, November 19, 2019 12:14 PM
To: Jennifer Livornese
Subject: Re: Respectful Request for Instrument Review

Hi Jennifer,

It looks like you're doing really interesting work.

I was able to take a quick read through your material. It looks good to me, although again, I don't have anything to compare it to. My one observation would be (as per our book), that it's useful to sort feedback into three types, each with a different purpose--Appreciation, Coaching, and Evaluation (which, by coincidence, we also call ACE). Too often, I think, feedback focuses only on the evaluation (here's your rating, grade, or how you stack up against....), and focus too little on appreciation and coaching (here's how you can improve).

Good luck with this project.

Best,

Founder, Triad Consulting
Lecturer on Law, Harvard Law School

Sent: Friday, April 10, 2020 5:36 PM
To: [redacted]
Subject: RE: Chapter 3 SME

Hi! I'm sorry it's taken so long for me to get back to you!

For your school leader interview form, I was thinking maybe you could ask about the leader's background knowledge in mathematics? Some administrators are former math teachers so they may be looking more in depth during observations. My husband was an administrator and he had been put over the math department at his school because he was a former math teacher, so the principal felt that's where he would be strongest. Not all schools have administrators with a math background, though.

For your teacher interview, maybe ask all of the certifications the teacher holds?

I hope this helps! Feel free to reach out if you need anything else!

Thanks,

Math Coach
Golden Gate High School
239.377.6162

Appendix E: Online Recruitment Letter

Date:

Dear School Leader or Teacher,

You are being asked to participate in a research study which may assist with understanding perceptions of mathematical feedback and the influence it has on teacher pedagogy in the intermediate mathematics classroom. This qualitative exploratory case study examines how viewpoints and feedback practices from school leaders and teachers in the Southwest Florida area influence teacher pedagogy. Through the investigation of school leader feedback, contextual conditions within the study may provide support to the school district in understanding how content knowledge in mathematics is imparted in school leader feedback. You were chosen to participate in the study because you teach or offer feedback in intermediate mathematics.

Participation in the study is voluntary and may entail evaluating mathematical feedback and answering questions about yourself. The entire questionnaire should take about 30 minutes to complete.

If you are agreeable to participate, please click the link below which takes you to the questionnaire.

Follow this link to the Questionnaire:

Or copy and paste the URL below into your internet browser:

If you have any questions or concerns, please feel free to reach out to me at [redacted] or reach out to Dr. Michelle McCraney at [redacted]

Thank you for your consideration!

--
Regards,
Jennifer F. Livornese
Doctoral Candidate | American College of Education
[redacted]

Appendix F: Open-Ended Questionnaire

Hello and thank you for agreeing to participate in the study. For the questionnaire, there are no right or wrong responses. I am only intent on aggregating your perspectives with regard to how feedback is provided in the intermediate mathematics classroom. No real participant names or identifiers are to be used in the research report.

1. In one or two sentences, please describe what feedback in mathematics means to you.

2. Describe a few different ways in which feedback has been either given or received in intermediate mathematics.

3. Describe what you believe is the most effective feedback in an intermediate mathematics classroom.

4. In two to three sentences, describe the school leader's role in providing feedback in mathematics to improve classroom instruction.

5. How significant is it for school leaders to identify practices in intermediate mathematics appropriate for improving classroom pedagogy?

Appendix G: Closed-Ended Questionnaire

Hello and thank you for agreeing to participate in the study. For the questionnaire, there are no right or wrong responses. I am only intent on aggregating your perspectives with regard to how feedback is provided in the intermediate mathematics classroom. No real participant names or identifiers are to be used in the research report.

Please mark one circle for the response, which best reflects your thoughts.

1. **What purpose does feedback serve for teachers in the intermediate mathematics classroom?**
   - o Improving teacher practice in intermediate mathematics.
   - o Annual evaluation purposes.
   - o To share information and guidance for best practices in mathematics.

2. **Feedback in intermediate mathematics should**:
   - o Inspire collective teacher and school leader collaboration for effective teaching practices in intermediate mathematics.
   - o Promote the development of groups or individual intermediate math teachers.
   - o Provide intermediate math teachers with options for professional development.

3. **Feedback delivered by school leaders to teachers is aligned to the mathematics discipline.**
   - o Agree
   - o Disagree

4. **In general, what do you perceive to be the most effective way of delivering feedback in the intermediate mathematics classroom?**
   - o With regular classroom walkthroughs with evidence and suggestions for activities noted by school leaders.
   - o Providing suggestions for pedagogical improvement by suggesting activities and tasks aligned with the standards and math curriculum.
   - o Suggestions for training or professional development taken through the district math department.

5. **Do you perceive feedback in intermediate mathematics as a growth-based process?**
   - o Yes
   - o No

6. **How is feedback communicated in intermediate mathematics feedback?**
   - o Mostly verbal with few written suggestions.
   - o Written feedback in the teacher's evaluation documents.

- Both written and verbal in person and in the teacher evaluation documents.
- Feedback is most general to the content area and is not content-specific.

7. **Choose the answer, which best reflects your beliefs.**
   Effective classroom feedback in mathematics provides opportunities for:
- Collaboration between the school leader and intermediate mathematics teacher to improve mathematical pedagogy.
- Implementation of effective instructional strategies to improve pedagogy and impact student learning.
- Alignment of the standards, curriculum, and best teaching practices for mathematical instruction.

8. **Classroom teachers meet regularly with school leaders to discuss professional needs in mathematics practice.**
- Agree
- Disagree

9. **An important aspect of school leadership is to ensure teachers, new and veteran, stay current with the most up to date practices in teaching mathematics.**
- Agree
- Disagree

10. **The most important aspect of feedback in intermediate mathematics is:**
- How the feedback is delivered.
- If the feedback provides an opportunity for instructional improvement.
- If the feedback leads to higher levels of teacher development in content practices.

Appendix H: Interview Questions for School Leaders

Name:
Site of Interview:
Date:
Introduction: The purpose of the qualitative exploratory case study is to investigate the scope and relevance of teacher and school leader perceptions of expert mathematical feedback on teacher pedagogy in the intermediate mathematics classroom in Southwest Florida.
I am not going to share information about you or anything you say to anyone outside of the researcher. During the defense of the doctoral dissertation, data collected may be presented to the dissertation committee. The data collected is kept in a locked file cabinet or encrypted computer file. Any information about you is coded and does not have a direct correlation, which directly identifies you as the participant. Only I know what your number is, and I am going to secure your information.
Interview questions:

1. Tell me a little about yourself.
2. How long have you been in the role of a school leader?
1. How often do you observe teachers in the field of mathematics?
3. Describe your beliefs about content knowledge and school leader expertise in intermediate mathematics.
4. Describe your beliefs about school leader content knowledge and teacher pedagogy in mathematics.
5. Consider the feedback you have delivered to intermediate teachers of mathematics. Describe how you, as the school leader, have delivered the feedback.

Probe: Describe the ways, means, forms of communication.

6. Describe how you feel when you are delivering feedback in the intermediate field of mathematics.
7. Describe what you perceive as effective in determining how mathematical feedback is received by intermediate mathematics teachers.
8. Describe how you have seen teachers use feedback in intermediate mathematics in the intermediate math classrooms.

Probe: Describe any professional development undertaken to increase math proficiency in teacher pedagogy.

Interview Questions for Intermediate Teachers of Mathematics

Name:
Site of Interview:
Date:
Introduction: The purpose of the qualitative exploratory case study is to investigate elementary teacher and school leader perceptions of content area feedback on teacher pedagogy in the intermediate mathematics classroom in Southwest Florida.
I am not going to share information about you or anything you say to anyone outside of the researcher. During the defense of the doctoral dissertation, data collected may be presented to the dissertation committee. The data collected is to be kept in a locked file cabinet or encrypted computer file. Any information about you is coded and does not have a direct correlation, which directly identifies you as the participant. Only I know what your number is, and I am going to secure your information.
Interview questions:

1. Tell me a little about yourself.
2. How long have you been teaching intermediate mathematics?
3. Describe your beliefs about content knowledge and teacher pedagogy.

Probe:

4. Over the past year, how many times have you been observed teaching mathematics by a school leader?
5. Consider the feedback you have received in mathematics. Describe how school leaders provide feedback in mathematics.

Probe:

6. Describe how you feel or ideas you have when school leaders are providing feedback in mathematics.

Probe:

7. Describe what you perceive as effective in determining how mathematical feedback is given by school leaders.

Probe:

8. Describe how you have used feedback from school leaders in the mathematics classroom.

Probe:

Appendix I: Reminder to Participate in the Online Questionnaire

Date:

Dear Participant,

Hello. I recently sent you an invitation to complete an online questionnaire if you are a school leader or teacher who has experience giving or receiving feedback. If you have not had a chance to do so, there is still time to complete the questionnaire and I would like to hear from you.

The questionnaire should take about 5-10 minutes to complete. You can access it on your computer or mobile device by clicking here:

Questionnaire link: https://www.surveymonkey.com/r/FCF5KMK

If you have any questions or concerns, please feel free to reach out to me at jwsweets@live.com or reach out to Dr. Michelle McCraney at michelle.mccraney@ace.edu.

Thank you in advance for your help.

Regards,
Jennifer F. Livornese
Doctoral Candidate | American College of Education