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Exploring Factors of Effective Virtual Mentoring of Novice, Rural K-12 Teachers

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Walden University
2018

Abstract

Exploring Factors of Effective Virtual Mentoring of Novice, Rural K-12 Teachers

by

Kendra Berger Turpeinen

MA, Marygrove College, 2007

BA, Bethel University, 2000

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Prior research on new teacher mentoring has focused on in-person mentoring to mediate rates of teacher attrition, yet few studies have explored applying digital communication technologies (DCTs) as tools for virtual mentoring of novice teachers, particularly for supporting novice rural teachers who may be at higher risk of attrition. The purpose of this qualitative case study was to explore how the virtual mentoring of novice rural teachers through DCTs reflected Hudson's five-factor model of mentoring. The research questions focused on how novice rural teachers and their mentors described the virtual mentoring experience and how the pairs interacted during the mentoring process. This single case study included two embedded units of analysis comprised of two mentoring pairs that contained one experienced teacher and one novice rural teacher who interacted using DCTs. Data were collected from interviews, reflective journals, and an online discussion forum. Single-unit analysis included open and axial coding and category construction. Cross-unit analysis involved the constant comparative method to identify emerging themes and discrepancies. Key findings showed that all of Hudson's five factors of in-person mentoring were present in the virtual mentoring interactions. Virtual mentoring provided novice teachers with flexibility, responsive mentoring, and a professional learning community for the sharing of resources, receiving affective support, engaging in reflection, and developing pedagogical and system knowledge through modeling and feedback. The results of this study contribute to social change by providing insights for educators and administrators interested in using virtual mentoring as effective support for novice teachers in rural K-12 schools.

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Dedication

This dissertation is dedicated to my Savior Jesus Christ. Only through His power at work in me was this research accomplished. Soli Deo Gloria!

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Chapter 1: Introduction to the Study

Since 1988, the U.S. Department of Education has tracked data related to teacher attrition and retention in K-12 American public schools (Goldring, Taie, & Riddles, 2014). For over two decades, close to 15% of K-12 teachers in the United States have left their current teaching assignments each year (Goldring et al., 2014). Attrition rates are consistently higher among early career teachers, and the attrition rate for beginning teachers has reached nearly 50% in some regions of the United States (Ingersoll, 2012). Of the beginning teachers leaving the profession, national data from 2012 indicated that 80% left teaching voluntarily for reasons other than their contract not being renewed (Gray & Taie, 2015). In particular, teachers in rural settings have higher rates of leaving the profession compared to those teachers in urban or suburban systems (Goldring et al., 2014). This is a factor for concern when nearly 33% of the nation's schools are rural (Johnson, Showalter, Klein, & Lester, 2014). In order to reduce attrition and address the needs for a growing number of novice teachers, many states have required formal mentoring programs for their teachers (Zembystka, 2016). The most recent national data indicated that in 2012, around 86% of first-year teachers reported they had been assigned a mentor to help with their induction into the profession (Gray & Taie, 2015). Some mentoring programs demonstrated success in reducing attrition, but the effects of induction programs were correlated with the quality and quantity of induction supports that new teachers receive (Ingersoll, 2012). A quantitative study of 1,159 beginning teachers demonstrated that novice teachers who received more comprehensive induction

support reported a significantly lower intention to leave the profession than their counterparts who received little induction support (DeAngelis, Wall, & Che, 2013).

The goal of this qualitative research study was to explore how digital communication tools (DCTs) were used to provide virtual mentoring for novice rural teachers. In regard to positive social change, this study explored how DCTs could strengthen teacher induction by finding suitable mentors for novice teachers, particularly in rural settings where small staff size and lack of resources make it difficult to match a new teacher with a mentor.

Chapter 1 encompasses a brief summary of the research literature related to the scope of this study, a discussion of the research problem, the purpose of the study, the guiding research questions, and the conceptual framework. In addition, this chapter includes an introduction to the research method, the definition of key terms, assumptions, limitations, significance of the study, and its social implications.

Background

Although the national average for teachers leaving the profession has hovered around 15% for over two decades, research on teacher attrition has demonstrated that this rate is higher for novice teachers. In a report on teacher attrition and mobility, Goldring et al. (2014) found that 20% of novice teachers left their positions in 2012-2013. The Goldring et al. report frames the need for more research to help mediate attrition rates among early career teachers.

School systems, often under the influence of state legislation and educational policy, have developed mentoring programs aimed at supporting novice teachers as they

enter the profession. Stanulis, Little, and Wibbens (2012) examined targeted mentoring as an intervention for enhancing the pedagogy of novice teachers. In their mixed methods study, the data showed that novice teachers who received intensive mentoring made noticeable gains in strengthening instructional quality and developing specific strategies for pedagogical content knowledge. This study from Stanulis et al. is part of a substantial body of current international research. In Australia, Hudson (2004a) reviewed the teacher-mentoring literature since 1993 to construct and test a five-factor model for effective mentoring, based on constructivist principles. Hudson's model emphasized in-person mentor activities that (a) helped a novice teacher construct knowledge of the profession from previous experiences and that (b) supported the novice in achieving professional potential. The model includes pedagogical content knowledge, mentor attributes, feedback, system requirements, and modeling. Hudson's five-factor model creates a helpful conceptual framework for examining mentoring exchanges.

Similar to Hudson's (2004a) and Stanulis et al.'s (2012) research, numerous studies about novice teacher mentoring have been conducted in face-to-face contexts, in which the mentor and the novice teacher share geographic proximity and common characteristics. LoCasale-Crouch, Davis, Wiens, and Pianta (2012) examined data from 77 novice teachers and their mentors to understand the association between mentors' attributes and novices' perceptions of mentoring support. They discovered alignment of mentors and mentees along common characteristics, such as grade level or content area, and they also found that increasing the frequency of mentoring interactions enhanced perceptions of mentoring support. Although LoCasale-Crouch et al. demonstrated that

novice teachers value frequent interactions with mentors who share similar professional characteristics, other research has shown that novice teachers who work in rural schools often perceive professional isolation. Handal, Watson, Petocz, and Maher (2013) conducted a mixed methods study of 191 teachers from 27 rural schools to explore their perceptions of the factors that contributed to rural teacher attrition. When describing the contributing factors for attrition, rural teachers identified five areas of professional isolation: being the only content area teacher in the school, the lack of opportunities for professional development, the lack of mentorships, the pressures of completing administrative tasks in addition to instruction, and the lack of teaching resources. Handal et al. discovered that these stressors were more acute for novice teachers in rural schools. Goodpaster, Adedokun, and Weaver (2012) also explored the challenges of retaining teachers in rural school systems. Participants in their study identified insufficient teacher mentoring as a factor that could influence a teacher's decision to leave a rural teaching assignment. Both Handal et al. and Goodpaster et al. emphasized the need for increased support of novice rural teachers. Although some research conducted with novice teachers who interact in-person with their mentors demonstrates the importance of building a mentoring relationship based on shared professional characteristics and geographic proximity, the conditions of rural schools often make this difficult. Rural teachers sometimes perceive a need for more professional support, but resources from within their schools limit this support.

In order to minimize the problem of insufficient mentoring support, some mentoring programs have matched a novice teacher with a mentor who does not work in

the same school building. A phenomenological study of nine novice teachers in a rural school district explored how teaching and learning coaches outside of the novices' school buildings provided mentoring support (Hobbs & Putnam, 2016). The coaches were district personnel who acted in the role of external mentors, with responsibilities for guiding novice teachers in multiple school buildings. Findings demonstrated that novice teachers perceived their coaches as helpful for providing instructional support, feedback, and affective support. Similar findings were discovered in another study. McIntyre and Hobson (2016) explored the experiences of 28 beginning physics teachers and their 13 mentors who worked outside the school. Novices perceived that their external mentors provided valuable support for increasing pedagogical-content knowledge and for reflection on practice. They also reported feeling less inhibited about learning from the expertise of their external mentors, without the pressures of hierarchical relationships inside their school buildings. However, Hallam, Chou, Hite, and Hite (2012) provided a contrasting perspective on the value of external mentors. In their mixed methods study of 23 novice teachers, data indicated that external mentors who did not work within the same school building provided less effective support than in-school mentors. Because they lacked proximity with their mentees, external mentors were unfamiliar with school norms and cultures and were not as helpful in inducting the novices into the social systems of their schools. More research is needed to understand mentoring interactions between a novice teacher and an external mentor. Furthermore, it is important to note that in McIntyre and Hobson's study (2016) and in Hallam et al.'s (2012) study, participants interacted in person with their external mentors. Although these mentors did not work in

the novices' school buildings, mentors and mentees did meet in person. Very little, if any, research explores whether external mentors who use DCTs to connect with novices in online environments are also effective in supporting beginning teachers.

Virtual mentoring of novice teachers is a growing body of research. Some studies demonstrated successful outcomes from using DCTs to mentor beginning teachers. Rock et al. (2014) demonstrated the feasibility of virtual mentoring as a viable support for novice teachers. Rock et al. implemented Skype video-conferencing for one-on-one virtual coaching of special education teachers. Virtual coaching correlated with increased use of evidence-based strategies for instruction and classroom management, as well as increased student engagement with academic content, with teachers continuing effective practices up to 3 years after the intervention. In other studies, data on virtual mentoring demonstrated how DCTs can facilitate mentor activities that mirror conventional in-person mentoring. In a qualitative study, Reese (2013) indicated that DCTs could help novice teachers observe master teachers and dialogue about best teaching practices. Twenty-one preservice music teachers worked with eight master teachers from five different states. The beginning teachers watched video capture of veteran music teachers modeling their practice and then participated in post-observation conferences to discuss teaching practice. Novices perceived that virtual mentoring helped them build their knowledge of pedagogy through dialogic inquiry. In another virtual mentoring study, Thurlings, Vermeulen, Bastiaens, and Stijnen (2014) examined teaching feedback shared among novice teachers who interacted in online synchronous environments to examine teaching videos of one another. Thurlings et al. discovered that online, synchronous

feedback processes are similar to in-person processes. Although the research of Reese (2013) and Thurlings et al. indicated that DCTs facilitate common mentoring activities, such as modeling teaching practice and offering feedback, more research is needed to demonstrate that these activities occur in virtual environments aimed at supporting rural teachers.

This study on virtual mentoring for novice rural K-12 teachers filled a gap in research related to exploring the effective factors of in-person mentoring in virtual mentoring exchanges. Although current research has demonstrated some positive outcomes for supporting novice teachers to receive mentoring through DCTs, these studies have also demonstrated conflicting results from assigning novice teachers to a mentor who does not work in the same school building. This study further explored the phenomenon of external mentoring that includes the use of DCTs.

Problem Statement

The problem in this study was that novice rural teachers are at risk of leaving the teaching profession because of a lack of suitable access to effective mentoring support associated with the limited personnel and material resources in their rural school systems. Current research has indicated that this problem is both relevant and meaningful to the field of education. In a five-year study, data collected from 1,990 beginning teachers across the United States demonstrated that the percentage of teachers who had been assigned a mentor their first year had up to a 15% higher retention rate, compared to beginning teachers who did not receive mentoring (Gray & Taie, 2015). These findings parallel earlier research conducted among 954 beginning teachers in Texas, who

participated in a formal mentoring program. Five years of data demonstrated that when novice teachers participated in mentoring their first year, their long-term retention was positively influenced, in comparison to novice teachers who did not receive the same mentoring support (Huling, Resta, & Yeargain, 2012). Although a significant body of research has examined the relationship between mentoring and teacher retention over the past three decades (Goldring et al., 2014), very little research has addressed effective mentoring for novice rural teachers who are at a special risk of stress from a lack of mentoring support, professional isolation, and lack of teaching resources (Broadley, 2012; Burton, Brown, & Johnson, 2013; Handal et al., 2013). Of concern is the higher rate of attrition among rural teachers compared with their urban or suburban counterparts (Goldring et al., 2014).

Even though DeAngelis et al. (2013) have shown the benefits of in-person mentoring for retaining teachers, beginning teachers in rural schools often struggle to find suitable mentors, due to small staff size and a lack of access to resources (Goodpaster et al., 2012). Goodpaster et al. (2012) called for more research on retaining rural teachers, noting that existing research has focused on reasons rural teachers leave their schools, but very little research explores practices to support their retention. One solution to the limited options for matching a novice, rural teacher with a suitable mentor might be looking for mentors outside of the rural school building. Mukeredzi and Mandrona (2013) demonstrated that effective support for novice teachers in rural schools does not need to come from within the school building. A study by McIntyre and Hobson (2016) corroborated the value of external mentors, but a contrasting study by Hallam et al.

(2012), of participants who did not work in rural schools, demonstrated that external mentors might not provide the most effective support. A review of the literature showed that more research about mentoring support from external mentors was needed. In particular, a gap existed in the research on whether or not virtual mentoring offered by a mentor outside of a school building could achieve some of the same positive outcomes as in-person mentoring.

Purpose of the Study

In light of the problem of providing effective new teacher mentoring in rural contexts, the purpose of this qualitative case study was to explore how virtual mentoring of novice rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring. Offering support to novice teachers through DCTs is a growing trend (Anthony, Gimbert, & Fultz, 2013; Bang & Luft, 2014; Bell-Robertson, 2014; Gronn, Romeo, McNamara, & Teo, 2013), and this study contributed to research on that type of mentoring. Specifically, the purpose of this study was to examine how five factors of effective in-person mentoring emerged in mentoring exchanges between veteran teachers and novice rural teachers who used DCTs to interact.

Research Questions

The research questions were based on the conceptual framework and literature review for this study.

Central Research Question

How does virtual mentoring of novice rural teachers through digital communication technologies reflect Hudson's (2004a) five-factor model of mentoring?

Related Research Questions

1. How do novice rural teachers describe the virtual mentoring experience?

2. How do mentors of novice rural teachers describe the virtual mentoring experience?

3. How do novice rural teachers and their mentors interact during the mentoring process as revealed in archival data?

Conceptual Framework

The conceptual framework for this study was rooted in Hudson's (2004a) five-factor model of mentoring. Hudson's model, which is informed by the philosophy of constructivism, identified five characteristics that foster an effective mentoring relationship to enhance the professional growth of teacher protégés. These factors include personal attributes, system requirements, pedagogical knowledge, modeling, and feedback (Hudson, 2004a; Hudson, Skamp, & Brooks, 2005). Table 1 describes each characteristic in Hudson's model.

Table 1

Hudson's Five-Factor Model of Mentoring

Mentoring Characteristic	Description
Personal attributes of the mentor	Mentor attributes enhance development of a professional relationship between mentor and protégé. Mentor attributes promote positive attitudes and confidence in the mentee and encourage professional practice.
System requirements	Mentors work with new teachers to help them effectively implement curricular requirements in the school setting.
Pedagogical knowledge	Mentors provide guidance in helping the protégé develop effective pedagogy.
Modeling	Mentors demonstrate desirable teaching traits and practices.
Feedback	Mentors make expectations explicit and provide guidance about the protégé's practice.

Note. From "Specific Mentoring: A Theory and Model for Developing Primary Science Teaching Practices," by P. Hudson, 2004, *European Journal of Teacher Education, 27*(2), p. 141. Adapted with permission of the author.

Hudson, Skamp, and Brooks (2005) developed this model through extensive review of empirical research on new teacher mentoring and statistically justifying each factor. As illustrated in Figure 1, Hudson's (2004a) model captures effective new-teacher mentoring in contexts where mentoring happens in-person and is a useful conceptual lens for exploring whether effective mentoring practices emerge during virtual mentoring. Collectively, the five factors provide a lens to better understand a mentoring relationship and to help move a novice teacher towards effective, autonomous teaching practices (Hudson, 2004a).
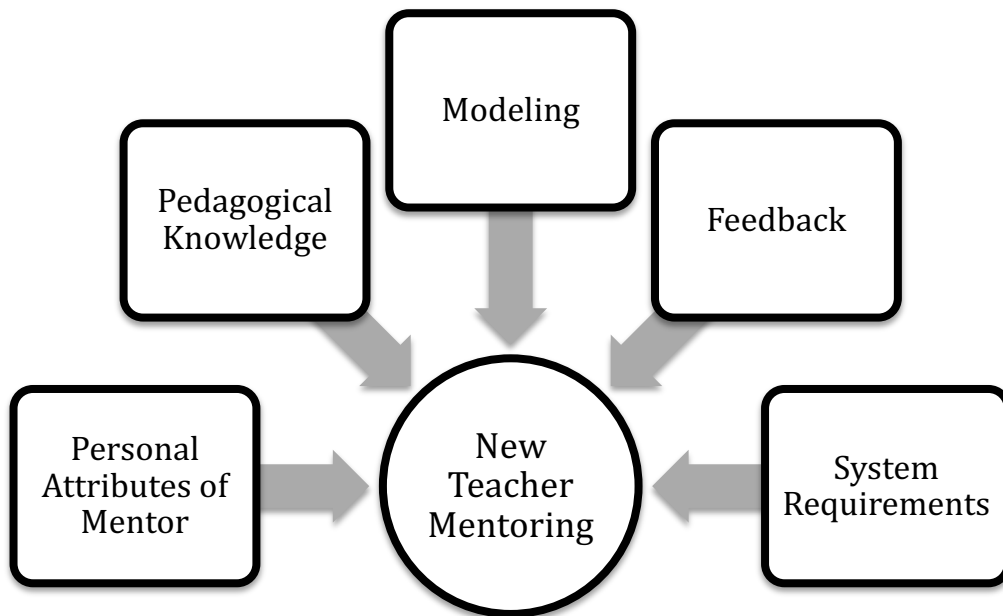
Figure 1. Visual model of Hudson's five factors. From "Specific Mentoring: A Theory and Model for Developing Primary Science Teaching Practices," by P. Hudson, 2004, *European Journal of Teacher Education, 27*(2), p. 141. Adapted with permission of the author.

Hudson's (2004a) five-factor model provided support for both the research design and the analysis of the data in this case study. The model was used in the research design to define the scope of the theoretical propositions guiding the study (Yin, 2014) and to structure the data collection instruments for the interviews, observations, and reflective journals. During the data analysis phase, the model was used to determine themes and discrepant data that emerged from the single unit and cross-unit analysis. In Chapter 2, I provide a more thorough explanation of each of the five factors of Hudson's model and how the model was used to support this study.

Nature of the Study

A qualitative research paradigm guided this study. It was appropriate because of the characteristics of qualitative research. According to Merriam and Tisdell (2016), qualitative methodology embodies certain characteristics: (a) a focus on exploring how participants make sense of their experiences, (b) the researcher as the primary instrument for collecting data, (c) the use of an inductive process to build understanding of the phenomenon, and (d) description that is thick and rich. Because virtual mentoring is a newer phenomenon in the landscape of novice teacher mentoring, these characteristics of qualitative methodology were helpful for gaining an in-depth understanding of how participants perceived and interpreted their experiences with virtual mentoring.

For this qualitative study, I used a single embedded case study design. Yin (2014) defined a case study in two parts. In the first part, Yin defines case study as a tool for empirical inquiry in which the researcher explores in depth a phenomenon in a real life context. Case studies are especially useful when the contextual conditions are particularly relevant to the case. In the second part of the definition, Yin emphasizes that case study research is a unique methodology in which the researcher collects data from multiple sources to explore multiple variables. I chose a case study design to explore the phenomenon of effective mentoring of novice teachers in the context of virtual interactions. The contextual condition of a virtual mentoring program was particularly relevant to studying the phenomenon of virtual mentoring interactions. To gain a deeper understanding of the phenomenon of virtual mentoring, I collected data from multiple sources to explore an array of variables.

The case for this study was a virtual mentoring program at the Mentoring Institute (a pseudonym), in which experienced teachers and novice teachers interacted using DCTs. Two units of analysis were embedded in the case. Each unit of analysis included one experienced teacher and one novice rural teacher who participated in the virtual mentoring program at the Mentoring Institute. Participants were novice rural teachers who had between 1 and 3 years of teaching experience and who interacted with a veteran teacher of the same grade level or in the same content area through the virtual mentoring program using DCTs. Specific inclusion criteria for potential participants will be presented in Chapter 3.

Data were collected from multiple sources, including interviews with novice rural teachers and their mentors, archival data of virtual mentoring interactions, and reflective journals from novice rural teachers and their mentors. Data were analyzed at two levels: within-unit analysis and cross-unit analysis (Merriam & Tisdell, 2016). At the first level, all data sources for each embedded unit of analysis, or mentoring pair, were analyzed through coding and categorization. At the second level, emerging themes and discrepancies were determined across all units of analysis to inform the key findings for the case (Merriam & Tisdell, 2016).

Definitions

Mentoring: "An activity, a process, and a long-term relationship between an experienced teacher and a less experienced newly qualified teacher that is primarily designed to support the new teacher's learning, professional development, and well-being

and to facilitate their induction into the culture of teaching" (Aspfors & Fransson, 2015, p. 76).

Mentor: An experienced teacher who supports, challenges, and guides novice teachers to develop autonomous teaching practices (Hudson, 2004b; Odell & Huling, 2000).

Virtual mentoring: A mutually beneficial relationship between a mentor and mentee facilitated through electronic communication. Through interactions mediated by DCTs, a more experienced individual helps a novice develop professional capacity. The use of DCTs creates flexibility for the mentoring process, overcoming barriers of time, geography, or culture (Bullock & Ferrier-Kerr, 2014).

Novice teacher: A less experienced teacher who is working in his or her first, second, or third year at the beginning of a teaching career (Goldring et al., 2014; Odell & Huling, 2000). Related terms used interchangeably in this research also include *beginning teacher* or *early career teacher.*

Rural teacher: An educator who works in a school located more than 10 miles from an urban cluster with a population of 2,500 to 50,000 people (National Center for Education Statistics, 2006).

Digital communication technologies (DCTs): "Tools that transmit digital data to enable interaction and communication" (Yamine, Ellis, Pedic, & Tan, 2014, p. 10). DCT encompasses web-based or mobile applications and may include, but is not limited to, e-mail, short message service (SMS), multimedia message service (MMS), voice-over-

internet protocol (VoIP), chat, instant messaging (IM), or asynchronous discussion

boards on a learning management system (LMS).

Assumptions

This study was based on several assumptions. The first assumption was that the

virtual mentoring program designed by the Mentoring Institute would yield data that

captured the phenomenon of virtual mentoring of novice rural teachers. This assumption

was important because it impacted the credibility and reliability of this study. The second

assumption was that participants would provide thoughtful and honest responses that

offered insight into the phenomenon of virtual mentoring through their interviews and

reflective journals. This assumption also impacted the credibility and reliability of this

study. The third assumption was that participants in the online asynchronous discussion

forums of the virtual mentoring program would not be inhibited in sharing their true

thoughts with their mentors in discussion posts, even though those thoughts would also

be viewed by other novice teachers who were participating in the group dialogue. This

assumption was important because examining the archived mentoring discussions

provided insight that the interviews and reflective journals did not.

Scope and Delimitations

The scope of a study includes the boundaries of that study and the rationale for

those boundaries. The boundaries for this study included the virtual mentoring exchanges

for a novice, rural teacher and his or her experienced mentor. These exchanges occurred

through the use of DCTs as the mentor and mentee interacted without sharing geographic

proximity.

This study was also bounded by the purpose of the study, which was to explore how five factors of effective in-person mentoring were reflected in mentoring exchanges between a veteran teacher and a novice rural teacher who used DCTs to interact. As the conceptual framework, Hudson's five-factor model of mentoring defined the scope of the study. Unlike other conceptual frameworks that emphasize the role of a mentor (Purkey & Novak, 2008; Anderson & Shannon, 1988) or the impact of mentoring on the professional growth of a novice teacher (Schon, 1987), Hudson's five-factor model of mentoring offers five categories of mentoring activities that defined the scope of effective mentoring that might lead novice teachers into autonomous practice.

The delimitations of this study involved the resources, the time, and the selection of virtual mentoring pairs for the study. In terms of participants, this study was limited to two mentoring pairs, in which each pair included one novice rural teacher and one experienced teacher who were matched by content or grade level and who interacted through the New Teacher Support (NTS) program (a pseudonym) at the Mentoring Institute. Pairs were limited to those teachers who interacted solely using DCTs. The study was further narrowed because my time and resources as a single researcher were limited.

Limitations

The research design of a study often creates limitations. Merriam and Tisdell (2016) cautioned that a researcher might demonstrate bias by excluding data that contradicts the researcher's previous experiences and beliefs. As a K-12 teacher who was inducted into the profession in a rural school, I carefully considered my potential bias. In

Chapter 3, I address the limitation of bias by describing strategies that I used to improve

the trustworthiness of this research. A second limitation of this study was related to the

amount of time that I, as the sole researcher, was able to devote to data collection. I

worked for 9 weeks to collect data, and I addressed the limitations created by time

constraints through triangulation of data, which I describe in Chapter 3. A third limitation

was related to the transferability of findings to other cases of virtual mentoring. The

results of this case study might only transfer to other mentoring pairs with similar

characteristics. To address the limitations related to transferability, I selected participants

from different schools.

Significance

The significance of a study was determined in relation to (a) providing an original

contribution to research, (b) improving practice in the field, (c) furthering innovative

learning and instruction, and (d) contributing to positive social change. In relation to (a),

this study examined virtual mentoring as a practice that contributes to effective support

for novice, rural teachers. Numerous researchers have examined the phenomenon of in-

person mentoring, but very few researchers have explored mentoring through DCTs as a

possibility for supporting novice teachers in rural schools.

In relation to (b), an increased understanding of the factors of virtual mentoring

provided insight that could improve existing virtual mentoring programs, or encourage

educators in public school districts to consider virtual mentoring as a viable option for

rural teachers. Since the 1980s, school districts across the United States have offered

formal mentoring programs as part of new teacher induction (Strong, 2009). In the last

decade, virtual mentoring programs have increased, but more research is needed to guide those programs to strengthen new teacher mentoring.

In relation to (c), this study contributed to a growing trend of implementing DCTs to support novice teachers (Anthony et al., 2013; Bang & Luft, 2014; Bell-Robertson, 2014; Gronn et al., 2013). Recent research demonstrated that mentoring programs for novice teachers that use DCTs have the potential to facilitate exchanging feedback on pedagogy from experienced teachers (Reese, 2013; Rock et al., 2014; Vernon-Feagans, Kainz, Ginsberg, Hedrick, & Amendum, 2013). They also have the potential to provide opportunities for reflecting on and improving practice (Gronn et al., 2013; Thurlings et al., 2014) and to strengthen teacher self-efficacy (Anthony et al., 2013; Owen, 2012). In addition, several recent research studies demonstrated the usefulness of virtual mentoring for supporting novice rural teachers to reduce professional isolation (Cooper, Williams, & Awidi, 2014; Erickson, Noonan, & McCall, 2012; Quintana & Zambrano, 2014). This study contributed to the understanding of innovative strategies for mentoring novice rural teachers.

In relation to (d), this study explored how digital technologies might solve a problem in teacher induction programs: the challenge of finding suitable mentors for novice teachers, particularly in rural settings where school staff size is often small and lacking in resources (Azano & Stewart, 2015). This study also contributes to solving the unique problem of teacher attrition in rural schools. According to Goodpaster et al. (2012), rural schools struggle to fill teacher vacancies and sometimes compensate for teacher shortages in ways that might adversely impact student achievement. The results

from this qualitative study showed that Hudson's (2004a) five factors of mentoring were also present in virtual mentoring, creating the possibility of using DCTs to support the induction of novice teachers as a viable solution for mentoring in rural schools. This study is expected to contribute to positive social change by providing a potential resolution to the unique problem of teacher attrition in rural schools.

Summary

This chapter was an introduction to this qualitative study, which used a case study research design. The background section included a brief summary of the research literature related to this study. The problem statement and purpose of the study focused on the need for increased understanding of virtual mentoring to support novice rural teachers and enhance their retention. The research questions outlined the guiding inquiry for this study and the conceptual framework section provided an introduction to Hudson's (2004a) five-factor modeling of mentoring (described in detail in Chapter 2). The section on the nature of the study presented an initial discussion of the selection of a case study methodology for this research. The definitions section offered an overview of key terms most salient for this study. Sections related to the scope and delimitations, as well as the limitations, indicated the boundaries of this case study. Finally, Chapter 1 concluded with a discussion of the significance of this study.

Chapter 2 includes a description of the literature search strategy for the literature review, presents the conceptual framework for this study, and provides a comprehensive review of current research related to the key concepts of this study. Chapter 3 includes

the research design for this study, Chapter 4 includes the analysis of the results of this

research, and Chapter 5 includes interpretations of the findings.

Chapter 2: Literature Review

The purpose of this qualitative case study was to explore how virtual mentoring of rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring. Specifically, this study examined how five factors of effective in-person mentoring emerged in mentoring exchanges between a veteran teacher and a novice rural teacher who used DCTs to interact. The problem is that novice rural teachers are at risk of leaving the teaching profession because of a lack of suitable access to effective mentoring associated with the limited personnel and material resources in their rural school systems. Researchers have demonstrated that when novice teachers work with a mentor during their early years in the profession, they are retained at higher rates than their peers who enter teaching without mentoring (Gray & Taie, 2015; Huling et al., 2012). However, these studies do not address the effectiveness of virtual mentoring as a support for novice rural teachers, who are at a higher risk for attrition than their urban and suburban peers (Goldring et al., 2014). The goal of this study was to examine the phenomenon of virtual mentoring of novice rural teachers in order to address the problem of novice rural teachers leaving the profession due to insufficient mentoring support.

Chapter 2 includes a review of the literature related to the purpose and the problem of this study. First, I describe the literature search strategy used to locate relevant and meaningful research related to this study. Next, I discuss the conceptual framework selected for this study, describing in detail the five-factors related to the mentoring model that guided this study and how this conceptual framework has been used in other studies. The remainder of Chapter 2 is devoted to reviewing literature that

addresses the key phenomena related to this study, including (a) the role of mentor attributes in mentoring, (b) the role of pedagogical knowledge in mentoring, (c) the role of modeling in mentoring, (d) the role of feedback in mentoring, (e) the role of system attributes in mentoring, (f) novice teacher perceptions of mentoring, (g) virtual mentoring, (h) unique conditions of rural schools that impact the work of teachers, and (i) mentoring novice rural teachers. This extensive review of the literature sought to describe what is known about the key concepts related to this study and what remains to be studied. In the final section of Chapter 2, I summarize the major themes that emerged in the literature review and addressed the gap in research, which this study fills.

Literature Search Strategy

To conduct this literature review, I examined peer-reviewed journal articles and other scholarly publications, such as dissertation studies, books, and research reports. Databases included Education Research Complete, Education Source, Thoreau, ERIC, Academic Search Complete, SocINDEX, Teacher Reference Center, Google Scholar, CINAHL, and The Learning and Technology Library, as well as a search for *new teacher mentoring,* which was conducted with all Walden University Library databases selected. In addition to searching these databases, I also conducted a search of Google Books on the Internet. My searches for relevant literature published in the past 5 years led me to explore four main topics: rural education, virtual mentoring, new teacher mentoring, and Hudson's five factor model. Each of these four topics generated key search words, which are listed in Table 2.

Table 2

Research Themes and Search Words

Research Topic	Search Words
Rural education	rural teacher, rural education, rural schools, rural schools and conditions
Virtual mentoring	digital teacher mentoring, digital tools and new teacher mentoring, e-mentoring, educational technology and mentoring, virtual mentoring, online mentoring, online mentoring and teaching/teacher,
Hudson's five factor model	five factor model and Hudson, pedagogy and new or beginning teacher, modeling, peer observation and beginning teacher, lesson study and new or beginning teacher
New teacher mentoring	beginning teacher and mentoring, new teacher and mentoring

To ensure that I understood the landscape of new teacher mentoring in the past 5 years, I conducted a large-scale literature search with the keywords *beginning or new teacher and mentoring* and selected all of Walden University Library's databases, capturing 571 peer-reviewed journal articles. When duplicate articles were accounted for, this search yielded 237 studies for review. I assessed these studies for their relevance to my conceptual framework and research themes, and then I organized them according to how they addressed Hudson's five-factor model of effective mentoring, rural mentoring, or virtual mentoring. However, the large-scale literature review did not yield an adequate number of articles to give me confidence that I had reached saturation on two elements of Hudson's model. As a result, I conducted more detailed literature searches for topics related to the role of pedagogy in new teacher mentoring and the role of modeling in new teacher mentoring. Table 2 shows the more specific terms used to find articles related to pedagogy and modeling. By conducting a comprehensive search of studies related to new

teacher mentoring, rural education, virtual mentoring, and Hudson's five-factor model of mentoring, I was able to achieve saturation of the literature.

Conceptual Framework

The conceptual framework for this study was Hudson's (2004a) five-factor model of mentoring. Hudson's model is rooted in the philosophy of constructivism, in which learners construct their new knowledge from prior knowledge and experiences (Hudson, 2004a). As a philosophy of learning, constructivism is useful for framing the mentoring of novice teachers, who work with an experienced mentor to build their knowledge of the complexity of teaching through refining their teaching methods to progressively construct their professional skills in content-specific areas (Hudson, 2004a). Hudson's model includes five characteristics, to guide effective mentoring relationships and to provide principles that allow for the constructing of knowledge during the mentoring process. These five factors include personal attributes, system requirements, pedagogical knowledge, modeling, and feedback (Hudson, 2004a; Hudson et al., 2005). Table 1 summarizes each characteristic in Hudson's model.

Table 3

Hudson's Five-Factor Model of Mentoring

Mentoring Characteristic	Description
Personal attributes of the mentor	Mentor attributes enhance development of a professional relationship between mentor and mentee. Mentor attributes promote positive attitudes and confidence in the mentee and encourage professional practice.
System requirements	Mentors work with new teachers to help them effectively implement curricular requirements in the school setting.
Pedagogical knowledge	Mentors provide guidance in helping the mentee develop effective pedagogy.
Modeling	Mentors demonstrate desirable teaching traits and practices.
Feedback	Mentors make expectations explicit and provide guidance about the mentee's practice.

Note. From "Specific Mentoring: A Theory and Model for Developing Primary Science Teaching Practices," by P. Hudson, 2004, *European Journal of Teacher Education, 27*(2), p. 141. Adapted with permission.

Defining the Five Factors

To conceptualize the five-factor model, Hudson (2004a; 2004b) reviewed empirical research related to general mentoring practices and conducted small-scale interviews with mentors and mentees. To test the model, Hudson et al. (2005) conducted a study of 331 preservice Australian teachers from nine universities. Participants of the study were primary science teachers, who had just completed their student teaching in their final year. The purpose of the study was to conduct confirmatory factor analysis on the five factors and their associated attributes, as well as to develop the Mentoring for Effective Primary Science Teaching (MEPST) instrument to measure mentee's

perceptions of their mentoring in primary science teaching. Figure 2 summarizes the

factors and associated attributes that were tested during Hudson et al.'s (2005) study. The

circles represent the five latent variables (Hudson's five factors of effective mentoring)

and the rectangles represent the measured variables using the MEPST instrument. Results

of testing the model indicated acceptable levels of Cronbach alphas, mean scores,

correlations, and covariances to establish significant correlations between the five factors

and the associated indicators in this final model (Hudson et al., 2005). For this study,

Hudson's five factors noted by the circles in the model were used to guide data collection

and organize data analysis. The associated attributes of each factor, as noted by the

rectangles in Figure 2, helped to identify the presence of the five factors during the

mentoring process during data analysis.
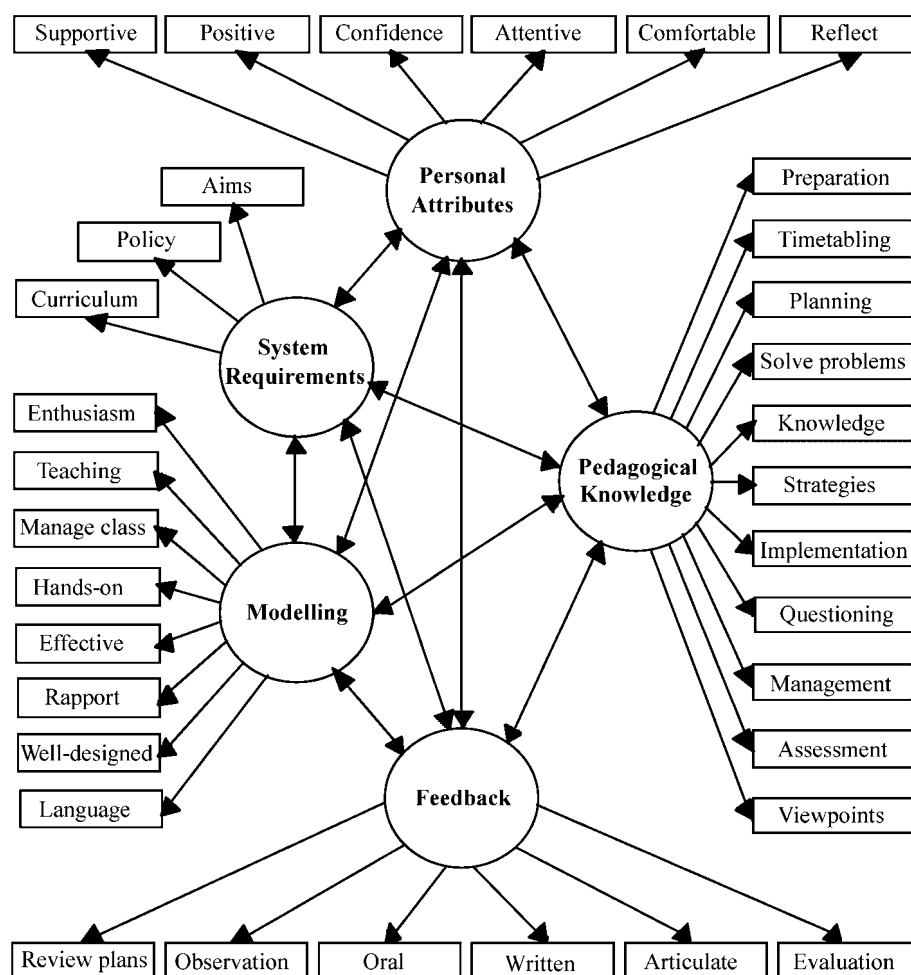
Figure 2. Hudson's five factors and associated indicators. From "Development of an Instrument: Mentoring for Effective Primary Science Teaching," by P. Hudson, K. Skamp, & L. Brooks, 2005, *Science Education, 27*(2), p. 665. Used with permission.

Personal attributes. Hudson (2004b) defined a mentor as "one who is more

knowledgeable on teaching practices and through explicit mentoring processes develops

pedagogical self-efficacy in the mentee towards autonomous teaching practices" (p. 216).

Inherent to successful mentoring are the personal attributes of the mentor, who facilitates

the mentee's development of effective teaching practices. Attributes such as being approachable and encouraging create supportive behaviors that directly impact the mentee's confidence (Hudson, 2004a). Other important personal attributes include attentive listening to demonstrate support, facilitating reflection on practices, and influencing positive attitudes towards the profession (Hudson et al., 2005).

System requirements. Mentors play a key role in helping novice teachers acclimate to school settings. System requirements for teaching include relevant school policies and content-specific curriculum with its objectives and requirements—both of which are influenced by local and national education policies (Hudson, 2004a; Hudson et al., 2005). Effective mentors induct mentees into understanding the education systems that will influence their teaching.

Pedagogical knowledge. Hudson (2004a) emphasized that pedagogical knowledge is content-specific. Guiding the mentee in developing pedagogy for specific subjects is critical for effective mentoring. Effective mentors help mentees with planning instruction, preparing instructional materials, pacing lessons, solving problems, teaching instructional strategies, managing the classroom, helping students develop inquiry skills, and assessing learning. In addition to facilitating skill development, effective mentors also contribute to the construction of pedagogical knowledge by sharing content knowledge and encouraging discussion of pedagogical philosophies, such as constructivism (Hudson et al., 2005).

Modeling. Effective mentors must model the unique pedagogy of specific subjects in a manner that is "consistent with current educational system requirements"

(Hudson, 2004a, p. 143). Modeling is critical for helping the mentee to conceptualize

effective teaching in a manner that contributes to their own development, especially for

helping the mentee to understand their own strengths and weaknesses. In addition,

modeling provides opportunity for the development of self-efficacy in teaching. Effective

mentors model enthusiasm for teaching, rapport with students, how to plan lessons,

language for the profession, classroom management, and effective practice (Hudson et

al., 2005).

Feedback. Hudson et al. (2005) asserted that constructive feedback is critical in

the mentoring process, since it provides the channel for reflection on practice that leads to

improvement. Effective mentors collect evidence of the mentee's pedagogical knowledge

through observations and reviewing instructional plans in order to provide written and

oral feedback. This feedback must be guided by expectations clearly articulated to the

mentee and must be responsive to the mentee's needs (Hudson et al., 2005). Feedback

helps the mentee evaluate his or her own performance under the guidance of the mentor

(Hudson, 2004a).

Previous Research Utilizing Hudson's Five-Factor Model

Following the initial test of the five-factor model in Australia (Hudson et al.,

2005), Hudson conducted quantitative, qualitative, and mixed methods studies using this

model as a conceptual framework. These studies included novice teachers from various

cultures and from various content areas. In a quantitative study with 331 preservice

Australian teachers who had completed their student teaching practicum, Hudson's five-

factor model was the conceptual framework for examining novice teachers' perceptions

of the mentoring they received in primary science and mathematics, with the aim of

strengthening mentoring programs (Hudson, 2007). This study utilized the MEPST

instrument to measure mentoring in science. In 2009, Hudson conducted a similar study

with 147 preservice Australian teachers, but limited it to examining perceptions of

preservice mathematics teachers. This latter study modified the original MEPST

instrument for measuring preservice teachers' perceptions of mentoring in primary

mathematics. Hudson (2009) demonstrated through empirical data that the five-factor

model and original survey instrument were suitable to transfer to a different content area.

Additional studies demonstrated the transferability of the model and the instrument

beyond Australia. In Turkey, Hudson implemented the MEPST instrument and used the

five-factor model as the conceptual framework to conduct a quantitative study with 211

preservice primary science teachers (Hudson & Savran-Gencer, 2009). Similar to the

2005 study, Hudson aimed to measure preservice teachers' perceptions of their mentoring

in primary science, but this time, the data were collected from English language-learners

in Turkish culture. The model and survey instrument proved effective for studying

mentoring in Turkey. Cross-cultural and cross-content use of the model extended to

Vietnam. In a quantitative study of 106 preservice teachers, Hudson, Nguyen, and

Hudson (2009) utilized the model as the conceptual framework to examine perceptions of

Vietnamese teachers related to their mentoring in teaching English as a foreign language

(EFL). The original MEPST survey instrument (Hudson et al., 2005) was modified and

tested for transferability to the content area of EFL. Hudson et al. (2009) statistically

justified the use of the model and instrument for mentoring in EFL.

After examining the use of the five-factor model in quantitative studies across cultures and subject-areas, Hudson examined its usefulness in qualitative and mixed methods studies, with a particular focus on measuring the perceptions of mentors. Thus, Hudson's conceptual framework was applied to a new set of studies, turning away from data collected solely from preservice teachers using quantitative instruments. In a mixed methods study of 14 Australian mentors of preservice primary science teachers, Hudson used the five-factor model to guide questionnaires and focus group meetings to explore mentors' perceptions of how to implement effective mentoring programs in schools (Hudson, 2010; Hudson & Hudson, 2011). Research for this study focused on one factor in the model: mentoring to enhance pedagogical knowledge (Hudson & Hudson, 2011). A similar study with 27 mentor teachers also focused on mentoring pedagogical knowledge and used the model as a conceptual framework (Hudson, 2013b).

Hudson's five-factor model has also proved useful in case study research. In a case study with one mentor paired with one mentee, Sempowicz and Hudson (2011) explored the mentoring practices used to guide a novice teacher in classroom management. The conceptual framework proved useful for "identifying, examining, and categorising (sic) data about the mentor's practices within a specific field of investigation" (Sempowicz & Hudson, 2011, p. 12). The model was suitable to guide collection and analysis of rich qualitative data from multiple sources. In another case study with six pairs of mentors and mentees, the five-factor model guided the semi-structured interview questions and subsequent data analysis of mentoring pedagogical knowledge through eleven practices (Hudson, Spooner-Lane, & Murray, 2013). Another

qualitative study used the five-factor model in a similar way (Hudson, 2013a). This qualitative study, in contrast, provided rich detail through two cases. In the first case, 28 experienced mentor teachers shared perceptions of how to mentor pedagogical knowledge, akin to Hudson et al.'s (2013) work. In the second case, however, one of the experienced mentors was paired with a preservice teacher in order to collect a sample of 45 mentoring conversations during student teaching (Hudson, 2013a). Through these two case studies, Hudson demonstrated that the five-factor model is suitable for a conceptual framework for case study research.

Although Hudson spent nearly a decade testing his five-factor model, other researchers have also utilized it as a conceptual framework for a range of studies. In a quantitative study of 147 preservice primary science teachers in Jordan, Abed and Abd-El-Khalick (2015) used the five-factor model and the MEPST survey instrument to guide data collection and analysis. The researchers noted the framework's usefulness for exploring mentoring practices in Jordan, in the absence of a unified construct of new teacher mentoring in that country. The model and the MEPST survey instrument were also applied in a mixed methods study in Turkey to examine the perceptions of preservice teachers and their practicum mentors in the area of primary science teaching (Akarsu & Kaya, 2012). Other researchers extended Hudson's work into new contexts. In another Turkish study, Hudson's model was used to develop and test an instrument for collecting data related to the perceptions of 1,846 student teachers regarding mentor roles (Koc, 2011a; Koc, 2011b). The study was the first in Turkey to examine mentor roles for a distance-learning teacher education program. In Zimbabwe, Hudson's model was the

conceptual framework for a study that compared data sets collected from preservice and in-service teachers who received mentoring (Mudavanhu & Zezekwa, 2009). These studies that additional researchers conducted demonstrate that Hudson's model is a suitable lens to analyze data collected in new contexts and cultures.

Application of Five-Factor Model to Current Study

Three aspects of this conceptual framework made it useful for this study: (a) the type of framework it provides for a case study methodology, (b) the characteristics of the model itself, and (c) the application of the model to studies similar to this one. First, Hudson's (2004a) five-factor model provided a type of conceptual framework that is useful for case study research. According to Maxwell (2013), a conceptual framework is often a visual representation that identifies the variables to be studied and delineates the relationships among them. It provides a tentative theory that informs all aspects of the research design. Yin (2014) echoed Maxwell's (2013) claim that existing theory contributes to a tentative theory about a phenomenon under study. However, Yin described this preliminary conceptualizing as constructing theoretical propositions that offer a blueprint for the study, in order to define its scope and guide the data collection and analysis. Furthermore, Yin asserted that without a clear set of theoretical propositions at the outset, researchers might be challenged in conducting case study analysis, in which the data are linked to the initial study propositions. Hudson's (2004a) five-factor model created a clear set of theoretical propositions that defined the phenomenon explored in this case study and how the data were gathered and analyzed.

Second, Hudson (2004a) noted the model has characteristics suitable for studying the phenomenon of new-teacher mentoring in various contexts. This model embodies principles of constructivism inherent to the mentoring process (Hudson, 2004a, p. 140), fosters flexible mentoring practices not tied to specific teaching contexts (p. 140), and is useful for increasing efficiency when studying mentoring because the complex mentoring process is focused on key, effective variables (p.144). These characteristics of the five-factor model enhanced my study as I examined mentoring in the new context of digital exchanges between novice rural teachers and their mentors. Hudson's five-factor mentoring model has been applied to in-person mentoring across cultures and contexts, but in my study, the model was a conceptual lens for analyzing how DCTs were used to create innovative virtual mentoring not bound by space. As Hudson et al. (2009) and Abed and Abd-El-Kahlick (2015) demonstrated the model is especially helpful for studying the phenomenon of teacher mentoring in the absence of an existing framework. Concerning my study, virtual mentoring of novice rural teachers using DCTs is an innovative type of mentoring without an existing framework. Hudson's five-factor model was relevant and useful.

Third, researchers who have conducted studies similar to mine have implemented Hudson's five-factor model (2004a) as a conceptual framework. My own study applied case study methodology with data collected from multiple sources, including data from mentors and mentees, and explored new teacher mentoring in a new digital context. Therefore, Hudson's model is suitable for qualitative research, and a case study methodology in particular (Hudson et al., 2013; Hudson, 2013a; Sempowicz & Hudson,

2011). Sempowicz and Hudson (2011) demonstrated the model's usefulness for identifying, examining, and analyzing rich qualitative data from multiple sources. Furthermore, the model has provided a framework for examining data collected from both mentors and mentees (Hudson, 2013a) and has been helpful for organizing semi-structured interviews (Hudson et al., 2013). This model has been tested in a variety of teaching contexts across content areas, cultures, and age groups, demonstrating its flexibility for exploring new teacher mentoring processes (Abed & Abd-El-Kahlick, 2015; Hudson et al., 2009; Mudavanhu & Zezekwa, 2009). Finally, research conducted in contexts without prior unified constructs of mentoring showed that Hudson's five-factor model is useful for exploratory research (Abed & Abd-El-Kahlick, 2015; Koc, 2011a; Koc, 2011b).

In the following sections of Chapter 2, I provide an in-depth review of literature related to new teacher mentoring, virtual mentoring, and the unique conditions of rural schools that impact the work of teachers. To organize current research about new teacher mentoring, Hudson's five-factor model (Hudson et al., 2005) provided a framework for guiding the discussion of mentoring. Specific topics addressed in this literature review included the following: (a) an overview of new teacher mentoring, (b) the role of mentor attributes in mentoring, (c) the role of pedagogical knowledge in mentoring, (d) the role of modeling in mentoring, (e) the role of feedback in mentoring, (f) the role of system attributes in mentoring, (g) novice teacher perceptions of mentoring, (h) virtual mentoring, (i) unique conditions of rural schools that impact the work of teachers, and (j) mentoring novice rural teachers.

Overview of New Teacher Mentoring

Teaching is a complex task that is not easily practiced outside of the job. Although beginning teachers receive training during their preservice programs, teacher preparation does not provide all of the knowledge and skills necessary for successful practice (Ingersoll, 2012; Ingersoll & Strong, 2011). A significant portion of teacher knowledge and skill can only be acquired during employment. Consequently, Ingersoll and Strong have asserted that teachers in the education profession have a responsibility to assist novices in learning the craft of teaching when they begin their careers.

In a review of empirical studies conducted since the 1980s related to new teacher induction, Ingersoll and Strong (2011) captured trends in new teacher mentoring. Since the mid-1980s, the teaching force in the United States has grown rapidly, from 50,000 first-year teachers in 1987 to 200,000 first-year teachers in 2007 (p. 204). This upsurge of newly hired teachers has influenced a proliferation of new teacher mentoring programs across the nation. In a national survey conducted in 2008, approximately 90% of first-year teachers reported receiving some type of induction support, including the support from being matched with a more experienced mentor (Ingersoll, 2012).

While new teacher mentoring programs are widespread today in the United States and often have similar goals, the type of induction support that they offer can vary a great deal (Ingersoll & Strong, 2011). For example, some programs are highly structured with formal meetings throughout the year; others involve only an initial mentoring session when school starts. Some mentors and mentees receive release time from classroom responsibilities to meet during the workday; others do not. Some mentors receive training

and compensation; others volunteer out of motives to give back to their profession. In spite of these variations in mentoring programs, Wood and Stanulis (2010) surveyed 70 studies on teacher induction between 1997 and 2008 and concluded that, in general, new teacher induction shares several common goals: (a) strengthen teacher quality, (b) prevent novice teacher attrition, (c) enhance the professional satisfaction and well-being of beginning teachers, and (d) improve student learning outcomes, particularly for diverse learners (p.135). To achieve these common induction goals, Wood and Stanulis (2010) pointed to new teacher mentoring as a key ingredient.

Mentors provide important support for novice teachers during induction into the profession. As Wood and Stanulis (2010) noted after their literature review, "Mentors are the central agents of change in induction programs" (p. 137), who help novices succeed at quality teaching by modeling their instructional practices. Other research substantiates this role of mentors. Hallam, et al. (2012) demonstrated that when a novice establishes a personal relationship with a mentor who was carefully matched to "effectively facilitate support and collaboration" (p.267), beginning teacher retention is positively impacted. A larger-scale, longitudinal study of 954 novice teachers in Texas revealed similar results. After tracking participants in a formal novice teacher induction program into the fifth year of teaching, Huling et al. (2012) discovered that high-quality support from a mentor during the first year of teaching influences long-term teacher retention and job satisfaction. The research of Hallam et al. and Huling et al. highlights the important impact that a mentor has on a beginning teacher. However, Ingersoll and Strong (2011) cautioned that, although their review of empirical studies did reveal that working with a

mentor positively impacted novice teacher satisfaction, commitment, and retention, effective new teacher mentoring is the result of a constellation of types of support. With the advancement of DCTs, the types of mentoring support available to novice teachers has continued to evolve. In recent years, virtual mentoring has become another element in the constellation of supports that schools might offer beginning teachers during their induction programs. Thus, one of the goals of this case study was to explore how DCTs could be used to provide effective virtual mentoring support to novice rural teachers working in K-12 schools according to the factors known to be important in mentoring relationships.

Role of Mentor Personal Attributes in Mentoring

The personal attributes of a mentor contribute to effective new teacher mentoring, and they are a foundational variable in mentoring outcomes (Hudson, Skamp, & Brooks, 2005; Pogodzinski, 2012). Types of teacher mentors can be categorized in different ways, including internal or external (McIntyre & Hobson, 2016) and formal or informal (Desimone et al., 2014). Mentors demonstrate particular characteristics as they engage in mentoring behaviors influenced by their perceptions and beliefs, as well as their education environments.

Characteristics of Mentors

The literature shows that the characteristics mentors exhibit depends on whether or not the mentees are formally or informally matched. Many school systems require that beginning teachers are assigned a mentor in their school building, who is designated as a formal mentor (Desimone et al., 2014). Formal mentors often provide helpful assistance

in orienting a novice teacher to the school environment and to specific requirements of the profession (Gut, Beam, Henning, Cochran, & Knight, 2014; Mann & Tang, 2012; Nasser-Abu Alhija & Fresko, 2014). Novice teachers also interact with other colleagues in their buildings to receive assistance. When a colleague acts in a mentoring role, but is not assigned by an administrator, he or she is designated as an informal mentor (Desimone et al., 2014). Desimone et al. researched the differences that were associated with whether a mentor had formal or informal status. In a mixed methods study with 57 beginning teachers and their mentors, Desimone et al. discovered that novice teachers interact more frequently with an informal mentor compared with their formal mentor. A particular strength of the study contributing to credibility was that the study rested upon multiple education settings across three different states with data collected at multiple points during the novices' first year. Results indicated that the informal mentor provided more support for issues arising in the moment and was especially sought for support regarding emotional issues or classroom management issues. Formal mentors, in contrast, were more likely to initiate contact with the mentee, guide the mentee in achieving performance standards, and observe the mentee's teaching to offer constructive feedback at specific intervals. Desimone et al. concluded that formal and informal mentoring are complementary, and both are necessary dimensions of new teacher development. In a mixed methods study with 23 beginning teachers, Hallam et al. (2012) discovered similar results to the Desimone et al. study in relation to the value of informal mentoring. Novice teachers who worked with colleagues in professional learning teams benefited from collaborative mentoring networks to receive more additional resources than their formal

mentors provided. While the work of Hallam et al. and Desimone et al. supported the importance of informal mentoring for novice teachers, their studies were conducted with participants who interacted in-person. A gap in the literature remained regarding whether or not informal mentoring that is offered virtually could provide effective support to novice teachers.

In addition to the difference a formal or informal mentor has on a mentor's characteristics, whether or not the mentor is internal or external also impacts the mentor's interactions. Internal mentors are located within a novice's school building, but external mentors are experienced teachers with similar subject expertise as the novice, but they do not work in the same building and may interact in-person and/or remotely (McIntyre & Hobson, 2016). In a study of 28 beginning physics teachers and their 13 external mentors, external mentors provided a support mechanism that allowed the novices to freely share about professional learning needs without feeling inhibited or criticized due to the pressures of their school cultures. Mentees did not perceive this same freedom with their internal mentors. Mentees, however, did perceive the external support as non-judgmental and therefore helpful in enhancing their knowledge of subject matter and pedagogy. External mentors also helped to connect the novices to a new, and wider, network of professionals to support their practice. McIntyre and Hobson concluded that external mentors provide discourse about teaching that offers a "refuge and reflexive space" not available within school buildings (p. 147), allowing new teachers to take risks without the pressures of hierarchical relationships in their schools. In my study, I examined the benefits of external mentors for the professional development of beginning teachers, and

therefore, of McIntyre and Hobson's research was particularly relevant. Even though their research demonstrated that external mentors could provide effective support, participants in their study interacted in-person. This study helped to fill a gap in research by demonstrating that external mentors who use DCTs to connect with novices in online environments could offer quality support to beginning teachers.

Besides formal or informal and internal or external status, mentors exhibit characteristics that enhance new teacher mentoring. Hudson, Skamp, and Brooks (2005) noted the importance of mentors who are supportive, attentive, positive, confident, comfortable in their roles, and reflective on their practice (see Figure 2). Supportive mentors actively build trusting relationships with their mentees. In a qualitative study with six first-year urban teachers and two induction mentors, Gardiner (2012) explored how mentors fostered trust. Factors building trust in new teacher mentorship included sustained contact over time, withholding judgment, and expressing empathy, while moving the mentee from a survival mindset to a growth mindset. Other qualities that contribute to trust included an approachable personality, availability, and a collaborative attitude (Hallam et al., 2012). Displaying vulnerability about their own challenges can help mentors build trust in mentoring relationship too (Kolman, Roegman, & Goodwin, 2017). Additional studies underscore the importance of trusting relationships. When mutual trust is fostered through exchanging ideas as colleagues, and the mentee is put at ease from a fear of judgment for exposing weaknesses, the mentoring relationship fosters knowledge construction (Adoniou, 2016; Bottoms et al., 2013; Chisholm & McPherson, 2014). Sowell (2017) emphasized that a trusting relationship with a mentor facilitates the

mentee opening his or her practice to observation and feedback and to reflecting on

practice. Supportive mentors also maintain a positive tone during the mentoring process

(Hudson et al., 2005). They affirm the mentee, buffer feedback, focus on novice growth,

orchestrate opportunities for the mentee to be successful, and provide reassurance (van

Ginkel, Oolbekkink, Meijer, & Verloop, 2016). In addition to expressing a positive tone

directly to the mentee, effective mentors also maintain a positive perspective about their

profession and their role in the profession. In a longitudinal case study of a mentor who

successfully helped three beginning teachers develop discussion-based teaching, Stanulis

et al. (2014) discovered the mentor had strong beliefs about effective teaching and was

committed to educational reform that brought best practices to students. The mentor saw

herself as an important leader and co-learner who held novice teachers accountable for

implementing new and effective instructional practices.

Effective mentors are attentive to the needs of their mentees, a quality that can

contribute to building trust. In a literature review of 30 empirical studies conducted since

2000, Crutcher and Naseem (2016) revealed that effective mentoring is based upon the

needs of novice teachers and is centered on the learning of the novice. Gardiner (2012)

discovered that effective mentors respond to the mentee's personal and professional

needs to create individualized mentoring based upon a holistic understanding of the

mentee. A mixed methods study with 18 Dutch mentors of novice teachers explored this

phenomenon of adaptive mentoring in depth (van Ginkel, Oolbekkink, et al., 2016). The

qualitative portion of this study demonstrated that adaptive mentors were attuned to the

emotional state of their mentees and built tasks from simple to complex to match the

novice's competence level. The quantitative portion of this study showed that the greater the number of adaptive activities mentors articulated, the more likely they were to support the personal construction of pedagogical knowledge and encourage mentees to monitor their own learning progress, as well as intentionally structure mentoring conversations to encourage a process of reflection. Although this Dutch study included an array of both qualitative and quantitative data, caution was warranted. The data were collected at just one point in time and therefore do not capture the dynamics of tailoring mentoring relationships to individuals over time.

Another important characteristic of effective mentors is that they are comfortable in their roles as mentors and demonstrate confidence (Hudson et al., 2005). Aligning mentors and mentees along common characteristics, such as grade level or content area, enhances a comfortable and supportive relationship between the mentor and mentee (LoCasale-Crouch et al., 2012; Pogodzinski, 2012). In a study of 16 mentors paired with 31 new teachers with shared content areas, Achinstein and Davis (2014) explored mentors' perceptions about important knowledge for effective mentoring. Mentors in the study believed that effective mentors should have knowledge of mentoring strategies, of their subject discipline, of formative assessment to assist novices in improving their own practice, and of pedagogical content knowledge. In a virtual mentoring study, Owen & Whalley (2017) discovered that effective mentors must possess skills in time management, boundary setting, and the ability to recognize and accommodate the needs of novices.

Formal professional development can equip mentors with knowledge, so they are more confident in their roles with beginning teachers (Aspfors & Fransson, 2015; Pogodzinski, 2012). In a qualitative Norwegian study, mentors shared perceptions of the value of formal mentor training (Ulvik & Sunde, 2013). Formal training helped the 20 Norwegian mentors develop skills in facilitating the professional development of their mentees and provided key conceptual knowledge and a mentor community for support while legitimatizing their roles as mentors. In another study, 13 mentor teachers from New Zealand participated in a two-year professional development program for enhancing their mentoring skills. Analysis of mentoring conversations revealed that interactions shifted from a focus on affective support and transmission of knowledge to novices towards a focus on student learning and critical reflection on practice (Langdon, 2014). The mentors who participated in more cycles of professional development activities in the program were more likely to move from the practice of transmitting knowledge to enacting habits of inquiry to help novices construct their own knowledge of pedagogy. In an additional study connecting professional development to subsequent mentoring activities, Leshem (2014) revealed that mentors who received professional development were more likely to focus on their interpersonal relationships with novices and help novices gain confidence, compared to their counterparts who did not receive professional development in mentoring. Matching mentors and mentees by similar characteristics and equipping mentors with training to enact their roles as mentors help to create mentoring interactions that strengthen the practices of novice teachers. Not only is knowledge of the

profession important for an effective mentor, but knowledge of how to help novices reflect on their practice is also important.

Effective mentors are reflective practitioners and help novices critically reflect on their practice as well (Crutcher & Naseem, 2016; Hudson et al., 2005). Gardiner (2012) discovered that effective new teacher mentors create space for inquiry, so the novice can seek clarification, articulate goals, thoughtfully analyze problems, and create future action steps. When that inquiry process begins with helping the novice focus on what is working, self-efficacy is enhanced. In another study, novices who reported a greater perception of support from their mentor also reported higher levels of reflection on practice (LoCasale-Crouch et al., 2012). Experienced mentors use questioning strategies to create scaffolded inquiry (Athanases, 2013; Olsher & Kantor, 2012). The ability to use questions is an important mentor attribute that helps novices intentionally and systematically examine their practice to enhance student learning (Athanases, 2013).

Thus, the literature related to the characteristics of mentors that influence the types of support they offer novices, ranged from studies about mentors' dispositions to the behaviors they exhibit during the mentoring process. The gap that remained in the literature was whether or not virtual mentoring creates an environment conducive to fostering similar dispositions and behaviors during the mentoring process. Research on mentors' attributes has been confined mostly to studies conducted through in-person mentoring exchanges, but my study explored virtual mentoring and the characteristics of mentors that emerged.

Perceptions and Beliefs of Mentors

The perceptions and beliefs of mentors are another dimension of mentor attributes that play an important role in the outcomes of mentoring. These perceptions can be influenced by internal conditions that reside within the mentor or by external conditions that reside outside the mentor. Internal conditions that influence perceptions of mentoring include perceptions of the role of the mentor and motivations to mentor. External conditions that influence perceptions of mentoring include culture and the arrangements of the mentoring relationship.

Internal factors influencing perceptions. How the mentor perceives his or her role is impactful. When a mentor perceives his or her role as a collaborator, rather than an expert, the mentor builds trust with a first-year teacher and facilitates learning by co-analyzing and co-reflecting on problems (Gardiner, 2012). A collaborative mindset about mentoring fosters a responsive attitude of support for novice teachers. In a study of 18 Dutch mentors, van Ginkel, Oolbekkink, et al. (2016) examined how perceptions of the mentoring role influence mentor behaviors. Perceiving that their role was to adapt to the needs of individual novice teachers, mentors reported that they provided emotional and psychosocial support for novices, helped novices construct practical knowledge of teaching, created a favorable context that fostered novice learning, and guided the behavior of novices to strengthen practice. Similarly, Ramnarain and Ramaila (2012) noted that a mentor might perceive his or her role as a nurturer who helps a novice master pedagogy. Other mentors perceive themselves in the role of colleagues with novice teachers. In a qualitative study of 18 mentor teachers, Gut et al. (2014) discovered that

when mentors perceived first-year teachers as equal colleagues, they presumed the novice was self-sufficient in the classroom and took a non-directive approach towards mentoring by listening or offering suggestions. Still other mentors perceive themselves in the role of inducting novices into the existing system of a new school. This instrumental mentoring role creates a mentoring relationship focused on procedures and transmitting knowledge (Mann & Tang, 2012; Sunde & Ulvik, 2014). Collectively, research shows that regardless of whether or not mentors view their role with a collaborative attitude aimed at helping the novice grow professionally or whether or not mentors view their role as inducting the novice into the pedagogy, social expectations, and procedures of their schools, how the mentor views their mentoring role influences the mentoring relationship.

How mentors perceive their roles influences the mentoring activities they engage in with novice teachers. However, when mentors express confusion about their roles, the mentoring relationship may experience adverse effects. For example, in a mixed methods study that included five mentor teachers as participants, Kahrs and Wells (2012) discovered that if mentors were unclear about their roles in the mentoring relationship, their interactions with mentees diminished over time and they exhibited reluctance to engage with the novice, expressing dissatisfaction about the mentoring relationship. Perceptions of dissatisfaction also emerged in a mixed methods study of 118 new teacher mentors across the nation of Israel (Nasser-Abu Alhija & Fresko, 2014). In this study, mentors who received training reported more conflict about their roles as a mentor and evaluator. These participants were concerned about how negative evaluations of teachers might reflect poorly upon their own competence as a mentor. These findings appear to

contradict other research demonstrating that professional development enhances the confidence of mentors by providing them a community of support and providing skills for helping mentees to grow professionally (Langdon, 2014; Ulvik & Sunde, 2013). However, researchers who conducted these contradicting studies did not mention whether or not mentors also acted in the roles of evaluators. Nasser-Abu Alhija and Fresko suggested that professional development influences higher expectations of mentoring outcomes, and mentors felt uncomfortable when their mentees performed poorly on evaluations. Research about mentors' perceptions of their roles demonstrates that when mentors feel conflicted about their roles, their satisfaction with their mentoring work decreases, a result that can influence their motivation to continue mentoring.

Another internal factor that influences mentor perceptions is motivation. Some mentors describe their desire to mentor as an important way of giving back to the profession (Reese, 2015). In a mentoring study in which urban teachers in their third year mentored teachers in their first year, beginning teachers reported that they were motivated to mentor newcomers because they wanted to improve the conditions of entry-level teachers and enhance learning for those students (Catapano & Huisman, 2013). Mentors often have a high intrinsic motivation for choosing to guide beginning teachers, and this intrinsic motivation may lead them to seek professional training of their own volition, with no benefits other than personal satisfaction (Ulvik & Sunde, 2013). In a quantitative Dutch study with 726 experienced teachers who had mentored novices, van Ginkel, Verloop, and Denessen (2016) examined the relationships between mentor teachers' motives and their perceptions of mentoring. The researchers were interested in

the degree that mentors expressed a motive to mentor based upon their desire for personal learning or a motive to mentor based upon their desire for generativity, defined as guiding the next generation. They also examined to what extent mentors aligned with an instrumental conception of mentoring which focuses on effective teaching practices or a developmental conception of mentoring which focuses on the mentee learning for their own professional development. Results showed that most mentors expressed a generative motive for mentoring, rather than a personal learning motive, and a stronger developmental conception of mentoring. A generative motive for mentoring correlated strongly with viewing mentoring as important for a novice's development. The research of van Ginkel, Verloop, and Denessen is especially helpful in understanding mentor motivations because of the large sample size in their quantitative study. They demonstrated that many mentors have generative motives for mentoring, and other research shows that generative motives can influence how mentors spend time with novices. In a case study of South African mentoring pairs, Ramnarain and Ramaila (2012) discovered that a generative motive influenced a master science teacher to work daily with a beginning teacher to successfully enact student-centered science curriculum. As these recent studies show, the motives that mentors bring to mentoring, such as guiding the next generation, influence their perceptions of what mentoring interactions should look like. Regardless of whether or not the mentor is a peer at the beginning of his or career, or whether or not the mentor is a veteran teacher, intrinsic motivation often influences mentors to perceive their roles as contributing to the professional development of novice teachers in order to give back to the profession. However, these kinds of

altruistic motives are not the only motives at play. Sometimes mentors are motivated to work with novice teachers to enhance their own professionalism.

In contrast to the research of Ulvik and Sunde (2013), who demonstrated that mentors sometimes choose to work with novices from altruistic motives, several studies have demonstrated that a desire for their own professional development may also motivate mentors to work with novice teachers. In a qualitative study of six elementary music teachers, Reese (2015) discovered that mentors perceived their work as valuable professional development, which provided them opportunities to reflect on their own practice and adopt fresh approaches. These results parallel a Brazilian study of ten elementary teachers who worked with university faculty to create an online mentoring program (da Graça Nicoletti Mizukami, de Medeiros Rodrigues Reali, & Simões Tancredi, 2015). Participants engaged in designing the program for 2 years and then implemented it with novice teachers for 2 years. Data indicated that mentors increased their awareness of their own teaching practices and viewed the program as critical professional development for revising their own pedagogy and constructing their knowledge of the profession. A strength of the study was its longitudinal nature, making it unique among the qualitative body of research on new teacher mentoring. Tracking mentor perceptions of professional development and subsequent mentoring interactions over 4 years provided rich data of the phenomenon of professional development as part of the new teacher mentoring process. In another case study of three mentoring pairs, results indicated that mentors perceived they had grown professionally as a result of working with novice teachers, particularly in the areas of knowledge of technology and new

creative ideas for instruction (Roff, 2012). Thus, as research in this section of the literature review indicated, how mentors perceive their roles influenced both the type of relationships they had with their mentees and the type of motivations that guided their mentoring activities. However, internal factors, such as motivation, are not the only factors that influence mentors.

External factors influencing perceptions. External factors also influence the perceptions that mentors bring to new teacher mentoring. Sometimes those external factors are influenced by paradigms about mentoring that exist within school systems. In a qualitative study with data drawn from Australia, Finland, and Sweden, researchers described three general perceptions: mentoring is supervision, mentoring is support, and mentoring is collaborative self-development (Kemmis, Heikkinen, Fransson, Aspfors, & Edwards-Groves, 2014). Each perception influenced the mentors' and mentees' dispositions that defined the mentoring relationship and activities. In Finland, mentoring was perceived as collaborative self-development, and therefore, Finish mentors often acted in the role of facilitator of meetings of new teachers who engaged in peer mentoring for mutual professional development and peer support. A study in the United States also underscores the impact of school cultures on mentoring relationships and activities. In a quantitative study with 184 novice teachers across 99 schools in Michigan and Indiana, Qian, Youngs, and Frank (2013) discovered that mentor perceptions of collective responsibility for student learning correlated significantly with how they interacted with their mentees. If mentors worked in schools with a strong sense of collective responsibility for student learning, then they interacted more frequently with

novice teachers, regardless of whether or not they were formally assigned or informal

mentors. Caution is warranted. The study had a relatively low response rate, and

collective responsibility was self-reported through only six survey questions. The cultures

of school systems create external factors that guide mentors' perceptions of how to

interact with their mentees, but other factors in the educational environment also come

into play.

The arrangement of the mentoring relationship can also impact how the mentoring

relationship is perceived. The clinical setting in which the mentoring takes places impacts

perceptions of mentoring. In a qualitative study with 18 teacher mentors, Gut et al. (2014)

examined three settings for mentoring: early field experiences, student teaching, and the

entry year of a beginning teacher. Gut et al. discovered that in each of these three

settings, mentors demonstrated different perceptions of their relationships and roles with

their mentees. First, mentors perceived that first-year teachers needed the most help in

becoming oriented to the school and their colleagues, as well as in fulfilling the many

responsibilities of the induction year. Second, how mentors and mentees are matched

impacts perceptions of mentoring. Research shows that mentoring pairs based upon

similarities is important. Both administrators and mentor teachers in a qualitative study

with 34 participants perceived that matching a novice teacher with a mentor in the same

subject or grade level is very important for the success of induction support (Lozinak,

2016). This finding was highlighted in a previous study as well. In a mixed methods

study that included 998 novice teachers and 791 mentors in Texas, data indicated that

when mentors worked with a novice teacher from the same subject area and same grade

level, they expressed significantly higher levels of satisfaction in their mentoring work (Frels, Zientek, & Onwuegbuzie, 2013). The high number of participants in this study lends strength to the results, which are particularly relevant to my own study because Frels et al. demonstrated the importance of matching novices and their mentors based upon same subject areas and grade levels. Because many rural schools cannot offer these types of matches due to their limited size, virtual mentoring is a possible solution for the problem. More research was needed to understand the perceptions of mentors who engage in virtual mentoring with novices of similar characteristics.

The research literature related to the perceptions and beliefs of mentors ranged from studies that examine the internal factors to the external factors that influence mentors' perceptions of their work with novice teachers. These studies included topics such as perceptions of mentoring roles, motivation, school cultures, and mentoring arrangements. The perceptions of mentors are just one type of mentor attribute that contribute to effective mentoring. A range of studies demonstrated that other mentor attributes are related to mentors' dispositions and behaviors that influence mentoring interactions. Some gaps in the virtual mentoring research remained. No studies were found that addressed mentor perceptions of the virtual mentoring process. Another gap that remained was research related to whether or not the virtual mentoring environment introduces additional mentor attributes that might positively or negatively impact the mentoring relationship when mentoring pairs use DCTs to connect. This study explored how mentors perceive using DCTs to connect with novice teachers who do not share proximity with the mentor. This gap was important to address for supporting mentors

who increasingly work in online environments to mentor beginning teachers, either formally or informally.

Role of Pedagogical Knowledge in Mentoring

Pedagogical knowledge is subject specific, and effective mentors guide novice teachers in studying and practicing how to teach subject matter (Hudson, 2004a). Hudson suggested that mentors support novice teachers in developing pedagogical skills in these key areas: planning instruction, preparing instructional materials, pacing lessons, solving problems, instructional strategies, managing the classroom, helping students develop inquiry skills, and assessing learning (p. 143). Hudson's outline of helpful practices for mentoring in pedagogical knowledge contributes to research that spans more than three decades. Shulman (1987) defined seven categories of teachers' knowledge important for effective teaching practice, including knowledge of content, general pedagogical knowledge (GPK), and subject-specific pedagogical content knowledge (PCK). For Shulman, GPK encompassed broad strategies and principles of teaching, such as classroom management, while PCK was a "special form of professional understanding" that encompassed a fusion of the knowledge of content and of pedagogy to guide the teaching of specific subjects (p. 7). Shulman believed that PCK was of special interest within teacher knowledge because it connected content and pedagogy to how concepts are presented and adapted for learners with diverse interests and abilities. For over two decades, researchers have explored how PCK applies to different school subjects (Gordon, 2012), including Hudson (2004a), who suggested that PCK is a foundational aspect of new teacher mentoring.

Shulman (1987) was interested in understanding how to capture the particular "wisdom of practice" (p. 11) of able teachers and how to pass that knowledge to novice teachers. Other educational researchers have demonstrated similar concerns. Feiman-Nemser (2001) was interested in how novice teachers transitioned from preservice training into competent professionals equipped with PCK for effective teaching (Feiman-Nemser & Buchmann, 1986; Feiman-Nemser & Parker, 1990; Feiman-Nemser & Remillard, 1995). Feiman-Nemser (2003) noted that even though novice teachers have participated in intensive preservice programs to learn to teach, "beginning teachers have legitimate learning needs that cannot be grasped in advance or outside the contexts of teaching" (p. 26). Hudson (2004a) concurred and included mentoring in pedagogical content knowledge as a critical dimension of effective mentoring relationships.

Conditions for Effective Mentoring in PCK

Review of current research reveals that several conditions are helpful for successfully mentoring novice teachers in PCK. These conditions include the attributes of the mentor and of the mentee, as well as the structure of mentoring interactions. Numerous studies demonstrate that mentor skills and knowledge contribute to the development of PCK in the practice of novice teachers. In a qualitative study that McDonald and Flint (2011) conducted in New Zealand, which included 17 mentors, they captured these mentors' perceptions of the understandings, attitudes, and skills needed to effectively mentor. According to participants, effective mentors must have broad PCK and up-to-date curriculum knowledge, but more importantly, they must critically reflect on their own practice and have skills to explain their practice to novices. Part of the

communication with novices that mentors noted as important was the ability to listen well and the ability to ask difficult questions that facilitate novices in examining their own teaching. Mentors believed that this questioning of practice must be balanced with an attitude of support and understanding while offering reassurance. Inquiry into practice as a means of developing PCK was also echoed in another qualitative study. Olsher and Kantor (2012) provided evidence that a mentor can influence a novice to strengthen pedagogy when the mentor engages the novice in conversations focused on inquiry into practice. Hume and Berry (2013) found similar results in their study with six student teachers, noting that one of the reasons that novices developed PCK was that their mentors demonstrated a "pedagogical curiosity and vocational responsibility" (p. 2123) that influenced the mentor to lead an ongoing professional dialogue with the novice teacher in a purposeful discussion of pedagogy.

Although McDonald and Flint (2011) provided evidence that mentors can enhance PCK through their own knowledge and skills, their findings were limited because they only collected data from one source. The results of their research, however, were corroborated by a more robust study that Achinstein and Davis (2014) conducted. In a qualitative two-year study of 31 novice teachers paired with 16 content mentors, Achinstein and Davis explored mentor perceptions about significant knowledge and practices needed for helping novices develop PCK. Mentors identified these important conditions for effective PCK mentoring: (a) mentoring strategies to communicate effectively with mentees and respond to their individual needs while accounting for the school context; (b) broad and deep content knowledge to help novices deliver instruction

to students; (c) PCK to support novices in addressing the specific needs of diverse

learners by organizing discipline-specific instruction and developing resources for

student understanding; and (d) knowledge of formative assessment to help both students

in the classroom and novice teachers. Mentors cited the importance of being able to

assess the knowledge and beliefs of their mentees and collect evidence about their

teaching practice to help them improve. Mentors also perceived the importance of

helping novices anticipate common struggles students might have during classroom

instruction and of assisting novices in relevant PCK to avoid those pitfalls.

    Additional studies parallel the findings from Achinstein and Davis (2014) about

important knowledge and skills for effective new teacher mentoring. Matching a mentor

and beginning teacher who share the same subject can help a novice develop PCK. For

example, Nasser-Abu Alhijah and Fresko (2014) discovered that when a novice teacher

and a mentor were matched according to subject areas, they had more conversations

about PCK than mentoring pairs that were matched only by grade level but not by

subject. In related research, McIntyre and Hobson (2016) found that matching a novice

teacher with a master teacher in the same subject area not only facilitated PCK

conversations, but also opened the way for conversations about innovative pedagogy,

which in turn enhanced the confidence of the novices and increased their interest in

teaching their subject. Besides mentor matching by shared subject, an attitude of critical

reflection on practice is important for helping a novice develop PCK. A literature review

of 30 empirical studies led Crutcher and Naseem (2016) to conclude that effective

mentors need a range of instructional strategies and the skills to recognize whether or not

they are present or absent in novices' practice. Effective mentors also know how to coach novices to strengthen their pedagogy, not only by identifying the mentee's needs, but also by helping novices probe their own practice and teaching philosophies to develop PCK. This latter finding was echoed in another case study of two novice high school teachers and their mentor. Achinestein and Fogo (2015) discovered that mentors need skills to identify the novice teacher's PCK and skills to help the novice develop their PCK across domains.

Not only do mentors perceive the importance of PCK in effective mentoring, but novices themselves also value PCK mentoring. In a qualitative study of six preservice teachers, Burbank, Bates, and Gupta (2016) examined novice perceptions of necessary support as they entered teaching. Participants noted the significance of PCK mentoring to increase their understanding of how to deliver discipline-specific content in a manner effective for student learning. The research of Ibrahim (2012) demonstrated that novices expect their mentors to have skills in pedagogy with training in the most current teaching methods and skills in active learning pedagogy. Research demonstrates that both mentors and novices perceive PCK mentoring as important for inducting a novice into the profession. However, it is not only the skills and knowledge of the mentor that affect successful development of PCK.

Although the mentor plays an important role in helping a novice develop PCK, attributes of the novice teacher can also impact how PCK develops. In a mixed methods study of three novice science teachers and three mentors over 1 year, Nam, Seung, and Go (2013) examined a mentoring intervention aimed at enhancing beginning teachers'

inquiry-based science instruction. Among the three cases, one teacher made greater gains in inquiry-based pedagogy than the other two teachers. Examination of the data revealed that the novice had an active and reflective attitude during mentoring, demonstrating a willingness to receive the mentor's advice and change practice. Tricarico and Yendol-Hoppey (2012) found a similar result. In a study of three novice teachers who received focused mentoring in how to enact differentiated instruction in the classroom, the novice teachers' ability to plan for differentiated instruction was related to the collegial relationship with the mentor and the novices' openness to considering feedback on teaching. Burbank et al. (2016) discovered a different element that impacts the effectiveness of mentoring in PCK. Their research with six preservice teachers in their licensure year demonstrated that the experiences of a novice teacher prior to student teaching have a significant impact on how they understand the development of PCK when they enter practice.

Finally, how the mentoring interactions are structured impacts how a novice teacher develops PCK. Nam et al. (2013) demonstrated that one-on-one mentoring is helpful when a novice is learning specific PCK, such as inquiry-based science instruction. However, more than one-on-one time with a mentor impacts the development of PCK. The techniques of a mentor when working with the novice teacher also play an important role. Achinstein and Fogo (2015) conducted an in-depth case study of two novice social studies teachers and their mentor to explore how mentoring exchanges impacted a novice to gain PCK. Data analysis revealed mentoring techniques that aided the development of PCK. The mentor and mentee engaged in a series of "decomposition of practice," in

which the mentor helped the novices identify and break down complex teaching practices

(p. 51). The mentor then guided the mentee in approximations of effective pedagogy,

allowing space to rehearse and practice complex techniques, while giving feedback. This

process allowed the novice to gradually increase approximations of effective pedagogy.

Additional research also underscores the importance of mentors who view acquiring PCK

as a scaffolded process. For example, Stanulis et al. (2014) examined the practices of a

mentor who worked with three novice teachers to effectively help them improve how

they led discussions in the classroom. Qualitative data revealed that the mentor engaged

the novices in an intentional process by identifying the current performance level of the

novice, creating learning situations for the novice that fostered inquiry, scaffolding

support for learning the target pedagogy, and preparing the novice for unassisted

performance. Tricarico and Yendol-Hoppey (2012) also underscored the importance of

scaffolding in order to help novices self-regulate their own teaching. They discovered

that effective mentors provided cycles of offering new knowledge about PCK,

opportunities to apply it to instruction, and coaching that enhanced novice reflection on

practice. The self-regulation of novices grew as they learned to integrate mentor feedback

and resolve dilemmas in their pedagogy. Gordon (2012) also emphasized mentoring as a

process that moves a novice teacher to greater PCK. Altogether, these studies

demonstrate the importance of mentoring interactions that provide structure for the

professional development of the beginning teacher.

     Although several studies demonstrate that the interaction of a novice with a

mentor impact how PCK develops, other research emphasizes the notion that contextual

working norms are also important. In a case study of six student teachers, Hume and Berry (2013) explored how novice chemistry teachers developed their PCK. The researchers discovered that, although preservice teachers had learned pedagogically sound principles for science instruction during coursework, the school climate where the novices completed their practicums restricted their development of emerging pedagogies. This finding parallels findings from a British study of 15 novice mathematics and science teachers (Haggarty, Postlethwaite, Diment, & Ellins, 2011). Data indicated that the school climate for mentoring emphasized classroom management as a top priority for induction. As a result, mentoring conversations focused primarily on behavior management, and the novice teachers' innovative ideas about pedagogy were not actively supported in the mentoring process.

The literature related to the conditions for effective mentoring in PCK included studies about mentor skills and knowledge, what the novice brings to the mentoring relationship, and how effective mentoring interactions are structured and are influenced by school contexts. Of the studies reviewed here, mentors and novices interacted in-person. The gap that remained was a lack of research that explored how mentors might share their PCK using DCTs and whether or not virtual interactions during mentoring are effective in helping a novice develop PCK. My study aimed to address current research on mentoring in PCK by examining how PCK emerged in mentoring interactions between novice teachers and their mentors who did not meet in-person.

Outcomes of Mentoring in PCK

Review of current research on mentoring in PCK revealed that targeted PCK

mentoring influences important outcomes for novice teacher retention and for student

learning. Although targeted mentoring in PCK can enhance the professional growth of

novice teachers, a lack of mentoring in PCK can have adverse effects on the motivation

of novice teachers to stay in the profession. In a mixed methods study of 336 early career

teachers in Australia, participants who expressed intentions to leave the profession also

perceived a lack of support in areas related to PCK: a lack of cooperative planning with

mentors; a lack of planned professional conversations with more experienced teachers,

especially supervisors; limited access to mentors; and a lack of sharing of teaching

resources among more experienced teachers (Burke, Aubusson, Schuck, Buchanan, &

Prescott, 2015). Conversely, novice teachers with intentions to stay in the profession had

more opportunities to work with mentors to develop their PCK through collaborative

lesson planning and sharing of resources.

In addition to improving novice teacher retention, mentoring in PCK influences

important outcomes for student learning. In a mixed methods study, three South Korean

novice science teachers and their mentors worked in a collaborative mentoring

partnership for one year (Nam et al., 2013). Quantitative data indicated that beginning

teachers increased their skills in designing and implementing lessons, improving

procedural knowledge, and strengthening classroom culture. Qualitative data underscored

these results: mentoring exchanges influenced novices to increase student-centered,

inquiry-based learning, to effectively use questions to stimulate student thinking, and to

increase active participation in class. Another study showed similar results. In a quasi-experimental study on new teacher mentoring, Stanulis et al. (2012) compared two groups of novice teachers: one group of 42 novices received a year of targeted intensive mentoring related to leading effective classroom discussions; the other group of 41 novices did not. Quantitative and qualitative data showed that new teachers who received intensive mentoring made noticeable gains in strengthening instructional quality and developing specific PCK strategies for leading classroom discussions. Stanulis et al. concluded that targeted mentoring in a complex area of pedagogy helps novices master key skills early in their careers. Other research also shows the benefits of PCK mentoring for novice special education teachers. Sebald and Rude (2015) found that targeted mentoring for special education teachers in their first 3 years prepared them better for their current jobs than their preservice university training. These research studies about student outcomes after novices are mentored in PCK are unique because they offer quantitative results about the positive impact of mentoring in PCK.

The research of Nam et al. (2013), Stanulis et al. (2012), and Sebald and Rude (2015) share something in common: when a novice teacher is mentored in PCK, instruction becomes more student-centered. Other studies substantiate this finding. In a qualitative study with 12 student teachers in the United Kingdom, Cajkler and Wood (2016) discovered that when novice teachers collaborated on lesson planning after observing master teachers in action, the mentoring process increased their awareness of planning instruction with learners in mind and increased the quality of learning experiences for their students. In a case study with physical science teachers who

participated in mentoring for professional development, Ramnarain and Ramaila (2012) also discovered a connection between student-centered learning and mentoring in PCK. As the mentor facilitated reflective conversations about strategies and PCK to teach science, the novice teacher reported "meaningful learning experiences and access to complex science concepts" for students (p. 260). Collectively, these studies demonstrate that mentoring a beginning teacher in PCK influences positive learning outcomes.

Although numerous studies demonstrated that mentoring a novice teacher in PCK has a positive impact on students, a few studies indicated the importance of PCK mentoring for novices who work in rural schools. For example, Hobbs (2013) collected qualitative data from three rural schools in Australia where teachers worked outside of their licensure to fill staffing shortages. Data analysis revealed that developing PCK in a new subject area was critical for novice teacher in sustaining their motivation to improve practice. Hobbs emphasized the importance of providing strong mentorships for these rural teachers. Research from Azano and Stewart (2015) demonstrated a different aspect of the importance of PCK mentoring in rural schools. Their Australian case study indicated that being prepared to teach students in rural schools requires specialized training to help novice teachers learn "place-relevant pedagogies" (p. 2) for their unique working conditions. Azano and Stewart noted that while novice teachers receive preservice training, this training does not necessarily prepare them for the specific PCK they will need to effectively teach students in rural settings in a manner that accounts for the unique needs of rural students.

The research literature related to the outcomes of mentoring novice teachers in PCK ranged from studies that show how PCK mentoring impacts retention to studies that demonstrated how PCK mentoring increases effective student-centered learning. The gap that remained was how PCK mentoring supports novice rural teachers. Although the research of Hobbs (2013) and Azano and Stewart (2015) demonstrated that educators in rural schools create unique working conditions that impact mentoring in PCK, little is known about whether or not a virtual mentor who works with a novice rural teacher without meeting in person can support the beginning teacher in developing effective PCK for their rural context. This study explored this phenomenon.

Role of Modeling in Mentoring

Learning to teach requires mastering a complex array of skills and dispositions that are often difficult to practice during preservice teacher training (Ingersoll, 2012). Watching and listening, while a more experienced colleague teaches, offer novices valuable opportunities to learn about the profession (Hendry et al., 2014), and when this modeling is scaffolded to help novice teachers progressively build their skills, it can provide important support to beginning teachers (Kolman et al., 2017). Mentors provide a type of vicarious learning when they model effective teaching behaviors and mindsets to novice teachers, in order to support beginning teachers in professional development (Hudson et al., 2005). A review of the research literature highlights several benefits of utilizing modeling of teaching practice as a means of fostering professional growth in both preservice and in-service novice teachers.

First, modeling enhances the teaching pedagogy of novice teachers. In his five-factor model of effective mentoring, Hudson (2004a) emphasized the importance of novice teachers observing more experienced colleagues to gain knowledge of the unique pedagogy related to their specific subject matters or grade levels. The research of Clark and Byrnes (2012) supports this aspect of Hudson's model. In their quantitative study, Clark and Byrnes analyzed survey data from 136 first-year elementary teachers and found that novices perceived modeling of effective techniques of instruction as "extremely helpful" (p. 49), and those novices who were given release time to observe other teachers, alongside sharing a common planning time with a mentor, rated their mentoring experiences as more positive than other beginning teachers who did not have these supports. In a case study of five first-year teachers from middle schools, the novices perceived observations of experienced teachers during instruction as one of the most significant professional development activities they engaged in, allowing them to see examples of pedagogy in action (Martin, Buelow, & Hoffman, 2016). The research of Reese (2013) further highlights the value of allowing novices to observe master teachers. In a qualitative study of 21 preservice music teachers who used DCTs to observe video capture of experienced music teachers, Reese discovered that the novices valued observing teachers in action and then discussing their observations through Skype conversations to build their knowledge of pedagogy. In other studies of preservice teachers, modeling has proven to be an important element in helping novices implement the complex pedagogy of differentiated instruction (Tricarico & Yendol-Hoppey, 2012) or the complex pedagogy of project-based learning (Grimes & White, 2015). In addition

to supporting preservice teachers, modeling also enhances the practice of novices who have entered the profession. Hendry et al. (2014) identified several benefits for newly hired university instructors who participated in peer observation. Data indicated that 82% had learned at least one new teaching strategy, often a strategy for engaging students during instruction. Hendry et al.'s results, however, should be interpreted with caution, because this quantitative study was based on a small sample size of 28 beginning instructors at one institution. In another study of four in-service teachers, two of whom were categorized as novices, Tan and Nashon (2013) discovered that professional development, which included peer observation of teaching, helped novice teachers shift from a teacher-centered pedagogy to a student-centered pedagogy. Whether or not novices are preservice teachers, K-12 classroom teachers, or university instructors, these studies collectively demonstrate that one important benefit of modeling is stronger pedagogy for beginning teachers.

Second, modeling also influences how a novice acquires professional behaviors. In a study about perceptions of mentoring support, Clark and Byrnes (2012) discovered that novice teachers valued observing experienced teachers who modeled professional behaviors when communicating with parents. In another study of novice lecturers at a university who participated in peer observation of teaching, Eri (2015) found that observations of a more experienced teaching peer enhanced knowledge of how to communicate instruction with an engaging delivery in the front of the classroom. Even though observing professional behaviors, such as effective communication skills, often helps novice teachers, observing professional habits of mind in action is also important.

A literature review of 30 empirical studies related to effective mentoring led Crutcher and Naseem (2016) to conclude that when mentors model professional teaching strategies, beginning teachers begin to develop a mechanism for observing teaching situations, analyzing them critically, and learning from them to improve practice. In this way, mentors model professional strategies for the job and provide concrete examples for future independent teaching. Sometimes learning about professional behaviors also includes learning how to handle mistakes. For instance, modeling allows a novice teacher to learn how to amend practice when learners do not respond well to instructional materials, in order to reduce a negative impact on learning during the lesson (Cajkler & Wood, 2016).

Third, modeling influences how a novice teacher develops a professional mindset. In a study of 6 first-year teachers and their mentors, Gardiner (2012) discovered that when a mentor engaged in co-teaching and modeling of teaching with a novice, the beginning teacher moved from a survival mindset to a growth mindset. A growth mindset was also discovered in a study that Gore and Bowe (2015) conducted of 39 early career teachers in Australia who observed each other teach lessons and engaged in follow-up feedback conversations. By participating in several cycles of observation and feedback, the novice teachers understood that their colleagues also wrestled with continuing to learn how to teach well. Other studies demonstrate that when a novice observes a more experienced peer, their confidence grows (Eri, 2014; Hendry et al., 2014). Learning to be a critical observer of mentor and peer teaching supports the development of novice teachers' professional mindset.

Several studies underscore the importance of modeling to help novice teachers develop habits of critical reflection on practice that leads to a professional mindset. In a mixed methods study with five early education teachers, professional development that included modeling through peer observation pushed participants to rethink their pedagogy related to geometry instruction (Moss, Hawes, Naqvi, & Caswell, 2015). This type of reflection on practice after observing other teachers was corroborated by data collected and analyzed from 39 beginning teachers in Australia (Gore & Bowe, 2015). In this study, participants were organized into small professional learning communities (PLCs), in which members took turns teaching a lesson for their group to observe and provide feedback. As peers modeled teaching to each other, the process of observation and feedback helped beginning teachers reflect on how their practices impacted learning outcomes. A study in the Philippines achieved similar results. Fifteen elementary science teachers also participated in a PLC focused on peer observation and feedback. Peer modeling and feedback cycles led to insightful reflections on instructional practices, including reflection on their assumptions about teaching and learning, their awareness of classroom dynamics, and how their individual approaches fostered or hindered learning (Gutierez, 2015). Even though these studies demonstrated the effectiveness of peer mentoring for enhancing critical reflection on practice through modeling, traditional one-on-one mentoring can also enhance critical reflection. During a qualitative study of one mentor and one first-year teacher, as the mentor modeled how to reflect on practice, the novice increased habits of inquiry to deepen critical reflection as the year of mentoring progressed (Olsher & Kantor, 2012).

Fourth, modeling reduces feelings of isolation for the novice teacher. In a qualitative study with eight beginning teachers who were enrolled in a methods of teaching course, the opportunity to plan lessons together and observe peers teaching those lessons allowed teaching candidates to understand that they were not unique in their struggles to teach well (Kotelawala, 2012). Similarly, 28 new instructors at an Australian university participated in peer observations of more experienced instructors (Hendry et al. 2014). Data indicated that viewing another senior colleague who was facing a similar teaching problem reduced feelings of isolation and provided reassurance. Gore and Bowe (2015) discovered that peer observation facilitated new professional relationships for novices that also reduced feelings of isolation. Kriewaldt (2012) concluded that the opportunity to collaborate on lesson planning and to view other teachers' instruction shifts teaching from an individual to a collegial activity.

Thus, the research literature related to the role of modeling in the mentoring process included studies that addressed how modeling by a mentor impacts learning pedagogy, developing professional behaviors, and acquiring professional mindsets. Of the studies reviewed here, only the research of Reese (2013) demonstrated how a more experienced teacher might effectively use DCTs to model teaching practice to novice teachers when they cannot meet in-person. The gap in the literature that remained was whether or not effective modeling of teaching behaviors and mindsets occurs during virtual interactions between a mentor and mentee who do not meet in-person. Although Reese's study explored virtual modeling as part of the mentoring relationship between a preservice teacher and a master teacher, in this study, I explored virtual modeling in the

context of a mentoring relationship between an in-service beginning teacher and a more experienced colleague.

Role of Feedback in Mentoring

Feedback to teachers is an important mentoring activity, according to Hudson's five-factor model (Hudson et al., 2005). Critical reflection about practice as a result of feedback is a key characteristic of effective new teacher mentoring, as evidenced in a literature review of new teacher mentoring research since 2000 (Crutcher & Naseem, 2016). In the five-factor model of teacher mentoring, Hudson et al. (2005) suggested that mentors might offer effective oral or written feedback to new teachers by discussing teaching observations, reviewing lesson plans, and conducting evaluations of teaching practice (see Figure 2). Research on teacher feedback in the past 5 years demonstrates that the source of teacher feedback and the qualities of that feedback are important for guiding teachers.

Sources of Feedback for Teachers

A number of feedback sources are often used with novice teachers. Feedback to improve teaching practice comes from multiple sources, including a mentor (Israel, Kammam, McCray, & Sindelar, 2014), students themselves (Sadler, 2012), or peers (Thurlings et al. 2014). First, a mentor can provide feedback through evaluation processes (Hudson et al., 2005). In a qualitative study of five new instructors teaching at the university level, Shagrir (2012) examined the influence of a formal evaluation system on the professional activities and professional growth of the novices. The beginning teachers were required to receive mentoring from a more experienced colleague as part of

evaluation procedures at their institution. Results indicated that feedback from the evaluation framework pushed the novices to focus effort on developing professionally—both in teaching skill and teaching confidence. Another qualitative study demonstrated further benefits of formal evaluation as a type of new teacher feedback (Israel et al. 2014). Data collected from 16 new special education teachers in K-12 schools, and their five assigned mentors indicated that a structured evaluation process implemented by mentor teachers had a significant impact on the interactions between mentors and mentees, guiding the type of feedback offered on instructional practices. The formal evaluation procedures focused mentors' attention on strengthening professional support for new teachers. Novice teachers valued the professional and emotional support offered in the context of the evaluation program, particularly the explicit feedback tied to strengthening areas of weakness exposed through the teacher evaluation rubric. The majority of new teachers indicated that having a mentor, who also acted as an evaluator, did not hinder their induction experience. However, a few novice teachers noted that the evaluative role of their mentors constrained the relationship. This finding underscored results in other studies. For example, beginning teachers often seek emotional support and classroom management assistance from those individuals who do not evaluate them (Desimone et al., 2014). Furthermore, when teaching coaches approach mentoring with an attitude of support, rather than evaluation, their feedback helps to build trust (Gardiner, 2012).

Besides feedback offered in the context of evaluation procedures, beginning teachers value feedback from mentors on their lesson plans (Burke et al., 2015) and on

their teaching (Kahrs & Wells, 2012). In a mixed methods study with 336 Australian teachers in their first 3 years in the profession, Burke et al. examined the types of support perceived as most valuable for early career teachers, including preferred format, focus and delivery of each type. In regards to feedback, novices indicated that they desired increased feedback and cooperation with experienced teachers to plan lessons and assessments. Teaching observations and post-observation conversations are also important to beginning teachers. In a mixed methods study with five novice teachers and their mentors, Kahrs and Wells discovered that novices desired teaching observations and subsequent feedback from their mentors, and when they did not receive the level of feedback they desired, they sought advice from others outside of the mentoring relationship. Lack of teaching observations and infrequent feedback from assigned mentors was a source of frustration to participants in the study and seemed to hinder the novices from developing habits of critical reflection on practice. Although the results of Kahrs and Wells appear to emphasize the importance of feedback through teaching observations, the write-up of their study lacked details about methods and data analysis, warranting caution in interpreting the findings.

Not only can mentors provide valuable feedback to teachers, but feedback sources can also come from the novice teacher's students or non-mentor teacher peers. In a study of 11 novice instructors in higher education, Sadler (2012) found that interactions with students were an important form of feedback that contributed to teacher development. When instructors implemented active learning strategies in the classroom, Sadler also found that they received richer feedback about their teaching, which in turn, enhanced

their critical reflection on practice. In addition, peer coaching also provides feedback to strengthen the professional skills of teachers (Thurlings et al., 2012; Thurlings et al., 2014). This coaching can be conducted in-person or virtually. In an early study, Thurlings et al. (2012) examined four peer-coaching groups in Holland—three which interacted in-person, and one which interacted virtually through wiki discussions. Thurlings et al. concluded that the effectiveness of teacher feedback is contingent on the patterns of interactions between providers and receivers. They observed that the virtual group demonstrated limited interactions and more characteristics of ineffective feedback; however, it was not clear if the virtual context impacted the feedback patterns or the limited coaching skills of the group facilitator. In a follow-up study, Thurlings et al. (2014) examined peer coaching again, but this time collected data from five groups of Dutch student teachers, who all interacted in online synchronous environments through Skype to exchange feedback on teaching videos. Of the five groups, three of them were facilitated by a teacher educator who acted as a mentor; two were facilitated by a student teacher from within the group. Results of this 2014 study indicated that online, synchronous feedback processes, which are aimed at strengthening the practice of novice teachers, are similar to face-to-face processes. In practice, online teaching feedback can be as effective as in-person feedback. Therefore, the aim of this study was to explore the phenomenon of feedback on teaching during virtual mentoring of beginning teachers.

Qualities of Effective Teacher Feedback

A number of qualities have been shown to influence the effectiveness of mentor feedback. In a literature review that Thurlings et al. (2013) conducted of 60 studies

published between 2000-2012, they delineated characteristics of effective feedback to teachers. Feedback that positively impacts professional growth is timely and frequent, engages the learner in correcting misperceptions, provides specific and accurate details, and focuses on the task and/or goal. Furthermore, effective feedback occurs in a context of coaching, offers concrete evidence, and creates cognitive dissonance. These characteristics influence teacher development and emphasize the importance of both the delivery of feedback and the content of feedback messages as the mentor interacts with the novice teacher.

First, the delivery of feedback messages impacts feedback effectiveness. In a quantitative study of 269 university students, Kerssen-Griep and Witt (2015) noted that participants observed an episode of instructor feedback on task performance and subsequently expressed their perceptions of whether or not a mentoring relationship was present. Kerssen-Griep and Witt found that students perceived a mentoring relationship was present when the instructor utilized positive nonverbal cues (e.g. smiling, eye contact, & vocal expressiveness) and interacted in a manner to help listeners protect their social image. Kerssen-Griep and Witt also found that the content of feedback messages impacts effectiveness. In particular, questioning techniques influence the quality of mentor feedback. In related research, Athanases (2013) discovered that the strategic use of questions during key mentoring activities (e.g. lesson planning or collaboratively examining student work) provides important feedback to foster reflection among new teachers. When the mentor uses inquiry to encourage the novice teacher to make discoveries about teaching and learning during mentoring activities, the feedback

enhances student learning and improves novice practice. Olsher and Kantor (2012) provided data that parallel these findings. In a qualitative self-study, they documented the usefulness of mentor questions as a feedback tool for moving a first-year teacher from focusing on the technical aspects of teaching, to thinking substantively about pedagogy and professional identity. Although the research of Athanases, as well as that of Olsher and Kantor, supports the importance of questions in the feedback process during mentoring, their studies should be interpreted with caution. Athanases noted limitations about populations and methodologies, and Olsher and Kantor presented a self-study in which the researcher was also a participant. However, in a quantitative study, Thurlings et al. (2012) confirmed the importance of open-ended questions as a source of feedback that enhances teaching practice, which Athanases and Olsher and Kantor also suggested. In particular, Thurlings et al. contended that closed questions and summarizing hinder the effectiveness of feedback to teachers.

Although current research points to the qualities of mentor feedback, other research indicates that additional external and internal factors influence feedback quality. In two quantitative studies that included a total of 295 first-year teachers in Belgium, Devos, Dupriez, and Paquay (2012) examined how school cultures, in addition to the frequency of interactions with more experienced colleagues, impacted teacher self-efficacy. Results revealed that school cultures with a mastery-goal orientation enhanced teacher self-efficacy when novices frequently interacted with mentors to receive feedback. In these types of school cultures, feedback on teaching and opportunities for critical reflection correlated significantly with self-efficacy. In addition to external

factors, such as school cultures, internal factors of the novice teacher determine the effectiveness of feedback. However, the presence of effective feedback is not enough to improve teaching practice because a novice teacher's openness to considering feedback also plays an important role in determining whether or not professional growth occurs (Tricarico & Yendol-Hoppey, 2012).

The current research literature related to the role of feedback in mentoring novice teachers addressed the qualities of feedback novice teachers appreciate, the sources of that feedback, and the content of effective feedback messages. The majority of studies that researchers have conducted about novice teacher feedback have included participants who engaged in synchronous, in-person mentoring exchanges. Although the findings of one study indicate that online feedback processes for teachers are as effective as comparable in-person practices (Thurlings et al., 2014), few studies were found that explored virtual feedback to beginning teachers. This gap in research related to the online delivery of feedback to novice teachers is especially important for novice rural teachers who may receive their primary mentoring support virtually. My study explored whether or not the qualities of effective feedback for beginning teachers emerged in virtual mentoring contexts.

Role of System Requirements in Mentoring

Mentors play a key role in helping novice teachers acclimate to school settings. System requirements for teaching include relevant school policies and content-specific curriculum with its objectives and requirements—both of which are influenced by local and national education policies (Hudson, 2004a; Hudson et al., 2005). Effective mentors

induct mentees into understanding the educational systems that influence their teaching. These systems include school cultures and climates, as well as external variables, such as state and national legislation.

Effective mentoring provides induction into the teaching requirements and social systems of local schools. In a case study with 14 first-year Australian teachers, Adoniou (2016) discovered that novice teachers perceived their need for mentoring support to become familiar with the social and political contexts of their schools. Mentors also perceive a need for inducting novices into school systems. In another case study with four novice English language teachers in Hong Kong, mentors perceived that inducting novices into system requirements was a primary purpose of their roles (Mann & Tang, 2012). The mentors indicated they assisted the novices in these key areas: helping the mentee become familiar with the physical setting of the school, explaining the scope and sequence of school-based curriculum, reminding mentees of daily routines, creating a bridge with the administration, guiding mentees in grading policies, offering suggestions in dealing with parents, and orienting mentees to technology in the school building (Mann & Tang, 2012). Mentors in an Israeli teacher induction program also perceived the importance of orienting new teachers to system requirements. In a study of 118 Israeli mentors, quantitative data indicated that mentor meetings at the beginning of the school year were focused on assisting teachers with the procedures and norms of schools, and male mentors emphasized the adjustment to school responsibilities during mentoring interactions more than their female counterparts (Nasser-Abu Alhija & Fresko, 2014). Findings from a qualitative study with 18 mentors paralleled the findings of the Israeli

study: mentors believed that a primary need of first-year teachers is help in gaining knowledge about school policies and procedures and learning how to manage their new responsibilities (Gut et al., 2014). Not only do mentors expect the mentoring process will involve induction into system requirements, but novice teachers also expect that their mentors will be "experts of basic campus policy," who can assist them in understanding school district and building policies, paperwork, classroom management, and technology (Frels et al., 2013, p. 46).

One dimension of induction into the system requirements of a new teaching job is becoming oriented to the social environments of schools. Mentors play an important role in helping novices develop collegial relationships. In a qualitative study of 16 novice special education teachers and their five mentors, data indicated that mentors contributed to improved instruction by connecting the new teachers with other professionals who could provide models of effective instruction and support for following school procedures (Israel et al., 2014). However, the geographical proximity of a mentor can have an impact on whether or not a novice teacher becomes inducted into the social systems of a school. In a mixed methods study with 23 beginning teachers from three different schools, one group of novices was coached by district mentors who did not work in the school building (Hallam et al., 2012). These mentors were considered master teachers, but their external position delayed fostering a support network for the new teachers during the first year. Because they lacked proximity with the novices, district mentors were unfamiliar with school cultures and could not facilitate the trusting relationships that the new teachers desired. Hallam et al. concluded that even though the

district coaches were often more experienced than mentors within the school building, their lack of proximity and lack of personal networks in the building prevented them from being the best source of support for the novice teachers. In contrast, in-school mentors provided a distinct advantage due to their understanding of school norms and ability to respond faster to the needs of novices. The results of Hallam et al.'s study are particularly relevant to this study. I explored how DCTs were used to support virtual mentoring for novice rural teachers. Virtual mentors were mentors who were not in the school building with a novice teacher. This study examined how virtual mentoring impacted inducting teachers into system requirements in their new jobs.

Induction into system requirements brings benefits to new teachers. New teachers develop confidence when their mentors help them adapt to their new environments (Crutcher & Naseem, 2016). In a quantitative study that included 182 Malaysian teachers, findings indicated that when a school system has an effective socialization process for new teachers, novices build new networks with colleagues, increase their workplace learning, and enhance their sense of wellbeing, which contributes to improved task performance (Tengku Ariffin, Awang Hashim, & Yusof, 2014). Mentoring that accounts for induction into system requirements can be especially beneficial to new teachers who work in environments that are not familiar to them. Qualitative data collected from six first-year teachers in an urban setting indicated that the novices felt prepared to deliver pedagogically sound instruction, but struggled to do so in an unfamiliar context (Gardiner, 2012). Gardiner discovered the novices valued a mentor who understood the nuances of their schools and could offer insights into adjusting instruction to meet the

needs of students in that context. Research conducted in rural settings parallels the findings of Gardiner's research with urban novice teachers. In a qualitative study of three first-year teachers in rural Idaho, beginning teachers perceived the benefit of mentoring in helping them adjust to the unique culture of their schools and to building strong collegial ties (Anderson, Fry, & Hourcade, 2014). Similarly, a mixed methods study of 282 novice teachers in Alaska revealed the importance of mentoring in system requirements to aid novices in adjusting to rural school cultures in a remote location (Adams & Woods, 2015). The findings for this study revealed that a mentoring program aided beginning teachers in coping with the stress of unfamiliar colleague interactions and unfamiliar local culture that impacted student learning and motivation.

Thus, the research literature related to the role of system requirements in mentoring ranged from inducting novice teachers into policies, procedures and practices of local schools to helping them acclimate to the social environments of their new jobs. The gap that remained in this literature was a lack of research on how effectively an external mentor, who is not a part of the novice teacher's daily school environment, can induct a teacher into system requirements for their work. This gap is important as support for novice teachers becomes increasingly virtual, allowing novices to use DCTs to connect with mentors who do not share proximity with them. Although the research of Hallam et al. (2012) indicated that external mentors provided less induction support than internal mentors, this study explored whether or not novice teachers received effective mentoring in system requirements when interacting virtually with a mentor. A case study

methodology provided rich data for exploring the phenomenon of virtual mentoring as a means of offering induction support for system requirements.

Novice Teacher Perceptions of Mentoring

Numerous studies have documented that formal mentoring programs influence positive outcomes in teacher induction. As Ingersoll (2012) pointed out, a formal mentoring program with effective support can help novice teachers to transition into the profession. Research on mentoring programs covers a range of mentoring activities and a range of perspectives on mentoring support. A body of this research captures the perceptions of the novice teachers who experience support from a mentor. A review of current literature portrayed three themes regarding novice teacher perceptions: (a) perceptions of their needs, (b) perceptions of mentoring activities, and (c) perceptions of how mentoring influences their teaching.

Novice Teachers' Perceptions of Their Needs

Novice teachers pursue mentoring for various reasons, each based on their perception of their needs. As inexperienced educators, some novices seek feedback from mentors on their instructional practices to strengthen their teaching (Kahrs & Wells, 2012). They are hopeful that mentors will not only observe their teaching, but also engage in follow-up dialogue that helps them reflect on practice and develop professionally (Gardiner, 2012; Kahrs & Wells, 2012). Novices value a truly collaborative relationship with their mentor and the opportunity for substantive conversations about learning in their classrooms (Adoniou, 2016). Other novice teachers seek a role model, who has more experience and can help them with problems common

to their teaching assignment, by offering encouragement, professional knowledge, and structure for the mentoring process in order to sustain it (Hobson, Harris, Buckner-Manley, & Smith, 2012; Paris, 2013).

Novice teachers also perceive a need for effective matching with mentor teachers. In a mixed methods study, Frels et al. (2013) explored perceptions of mentoring experiences among 998 novice teachers, 791 mentors, and 73 school principals. Findings related to novice teachers indicated that beginning teachers desired a match with mentors who shared common grade level, planning time, and related content area. When novice teachers believed that these commonalities were not a part of their mentor matching, they perceived a barrier to effective mentoring and to effective support for their professional needs. Other studies document novices' desires for mentors with common characteristics. In a quantitative study of 77 novice teachers, results showed that novices who were mentored by an experienced teacher in the same grade level perceived higher levels of teaching support (LoCasale-Crouch et al., 2012). Roff's (2012) qualitative research corroborated this finding. Analysis of interview data revealed that mentees who shared subject areas with their mentors perceived a more positive mentoring experience, while those mentees who had a mentor in their building, but did not share subject areas, perceived a lack of help with curriculum-specific challenges. Other research has documented that, in addition to sharing grade levels and subject areas, sharing goals and values with their mentors are also important to novice teachers (Adoniou, 2016). Although novices often identified a need for feedback or a need for sharing common characteristics with their mentors, their perceptions of their needs sometimes changed

during their induction experience. For example, Gardiner (2012) gathered qualitative data from six novice teachers for one academic year. The findings demonstrated that as the school year progressed, mentoring exchanges moved from conversations to help novices survive daily dilemmas, particularly those related to classroom management, to conversations focused on long-term professional learning and reflection on practice. The findings of Hallam et al. (2012) also demonstrated the change in how novice teachers perceived their needs. Longitudinal data collected over 3 years demonstrated that in the first year, novice teachers perceived a need for frequent communication with the mentor, but by the third year, novices expressed more interest in increasing collaboration with their mentors and less interest in determining how frequently their mentors were available to offer help.

These studies about mentee perceptions of their own needs underscore the importance of providing novice teachers with mentors who share similar characteristics, who are available for conversations on teaching practice, and who can offer flexibility as the needs of the novices change throughout the induction period. In rural schools, beginning teachers might not be able to find mentors with these qualities, and virtual mentoring might provide a solution to this challenge. More research was needed to explore how virtual mentoring can facilitate meeting the perceived needs of novice, rural teachers.

Novice Teachers' Perceptions of Activities in the Mentoring Relationship

Novice teachers perceive certain activities in the mentoring relationship to be valuable for their support during induction and for their ongoing professional growth.

According to some beginning teachers, interactions that provide affective support constitute a type of helpful mentoring activity. In a mixed methods study, Brannan and Bleistein (2012) collected data from 47 novice TESOL teachers to understand their perceptions of the mentoring support they received. When beginning teachers had limited or no contact with their assigned mentors, they expressed feelings of isolation. When mentors spent time with them, participants valued pedagogical support and affective support demonstrated by listening, offering advice, and sharing experiences. Novices valued encouragement and affirmation from their mentors, particularly after they confided in them about their teaching weaknesses. In a peer mentoring study, qualitative data also substantiated the importance of the affective domain of mentoring relationships (Cowin, Cohen, Ciechanowski, & Orozco, 2012). Participants perceived that effectual mentoring relationships were not merely the transmission of knowledge from a more experienced practitioner to a novice, but a relationship with dimensions of affirmation, encouragement, and commitment. Results from a qualitative study of art educators paralleled Cowen et al.'s findings. Ten beginning art teachers acknowledged that their more experienced mentor had taken on a role as a friend who offered not only helpful critique of teaching practice, but also a type of "pastoral care" that mitigated feelings of self-doubt by celebrating successes and offering guidance (Paris, 2013, p. 153). The research of Clark and Byrnes (2012) further confirmed these findings. In their study, novices perceived two mentoring activities to be the most helpful: listening and encouragement during times of self-doubt. Other novice teachers perceived that mentoring is important for helping them gain confidence as they enter the profession

(Nolan, Morrissey, & Dumenden, 2013), and they valued a mentor who is available and personable (Cook, 2012). Collectively, these studies demonstrate that novice teachers perceive affective support as a critical dimension of mentoring exchanges. However, other mentoring activities are also valuable to beginning teachers.

Another body of research indicates that novice teachers perceive pragmatic help with teaching to be a useful mentoring activity. In a preliminary study of 61 teachers applying to participate in a mentoring program, findings indicated that applicants hoped to enhance their teaching resources and increase their practical information for improving instruction (Nolan, et al., 2013). Participants in a different study emphasized practical knowledge as well. In a related study, novice teachers identified these mentoring activities as useful: exchanging ideas on instruction and classroom management, sharing resources, obtaining feedback after teaching observations, and receiving guidance to correct practice (Brannan & Bleistein, 2012). Assistance in understanding routines and procedures is also important to beginning teachers (Frels et al., 2013; Mann & Tang, 2012), as well as participating in cooperative lesson planning and obtaining technology support (Burke et al., 2015). A study of 97 novice teachers in Illinois corresponds with some of these findings. Beginning teachers perceived satisfying mentoring experiences when mentors were attentive to their practical concerns by answering questions, offering suggestions, helping with lesson planning, and assisting with establishing professional goals (Cook, 2012). Beginning teachers in the United States are not the only educators who value practical support when they enter the profession. In a five-year mentoring study in Estonia, quantitative research revealed that novices perceived mentoring support

as helpful if it included discussing concerns about pedagogy and exchanging teaching materials (Eisenschmidt, Oder, & Reiska, 2013). Participants in the study most frequently mentioned the value of sharing problems with their mentors and discussing solutions. Taken together, these studies demonstrated how novices value support for the pragmatic dimensions of their jobs. Although novices may pursue practical help to address their perceived needs, sometimes elements of their school cultures play a role in their perceptions of mentoring interactions.

Additional research has demonstrated that how novice teachers perceive their mentoring relationships is tied to the types of support structures and cultures within their schools. In the Netherlands, Gaikhorst, Beishuizen, Korstjens, and Volman (2014) examined data from beginning teachers who perceived that their induction support was positive. They found that novice teachers with a positive perception of their mentoring support worked in school cultures with several helpful mentoring activities. Novice teachers received regular classroom visits from more experienced educators, had numerous opportunities to observe the teaching of experienced colleagues, were encouraged to identify their own needs for professional growth, and were allowed to pursue individualized professional development. Specifically, these school cultures were collaborative in nature with a strong commitment to helping one another and encouraging one another to learn from mistakes. Opportunities to collaborate were formally structured, and novices were paired with experienced teachers in work groups. As a result, beginning teachers had numerous opportunities to discuss teaching experiences with their mentors and to collaborate with colleagues to achieve shared educational goals.

All of these activities contributed to novice perceptions of satisfaction with mentoring support. Of particular importance in Gaikhorst et al.'s research is the emphasis on collaboration in the school culture.

In a large-scale Canadian study, Kane and Francis (2013) confirmed the benefit of collaboration with mentors. In a three-year study of the Ontario New Teacher Induction Program, Kane and Francis conducted secondary data analysis on a qualitative database that included 300 beginning teachers, 150 mentors, and 110 principals. They concluded that across the Ontario province, induction programs focused mostly on elements of entering the teaching profession that were easy to present to novices, such as school policy and procedures, rather than more complex support related to fostering effective instruction. They found that when novice teachers engaged in collaboration with more experienced colleagues, the mentoring moved into a domain of teacher development that enhanced the quality of teaching and learning in the classroom. The results of Kane and Francis' study support what some research has revealed about how novice teachers perceive their own needs. Novice teachers appreciate the initial help of a mentor in becoming oriented to their new schools (Frels et al., 2013), particularly if they work in rural schools (Adams & Woods, 2015; Anderson et al., 2014), but they also perceive needing support through more complex collaboration with their mentors, such as increased opportunities to reflect on practice (Kahr & Wells, 2012), affective support during challenges (Brannan & Bleistein, 2012; Paris, 2013), and feedback after teaching observations (Brannan & Bleistein, 2012). Although the research of Kane and Francis is limited by secondary data analysis, the findings are strengthened by a large sample size,

which corroborates other research. Both Gaikhorst et al. (2014) and Kane and Francis demonstrate the importance of a culture of collaboration in school environments in order to support novice teachers in meeting their professional development needs.

In addition to practical help and a work environment that values collaboration, further research supports the notion that novice teachers perceive the importance of frequent interactions with their mentors. For example, data collected and analyzed from 791 beginning teachers showed that novices believed the mentoring relationship was impaired if the mentor demonstrated a lack of time or motivation for working with them (Frels et al., 2013). Teachers in Hong Kong expressed the same beliefs in a case study exploring perceptions of mentoring. Participants in the study indicated that they highly valued regular interactions with more experienced teachers (Mann & Tang, 2012). Early career teachers in Australia expressed the same value for regular conversations with mentors. In a quantitative study of 336 early career teachers, 63% of the sample who indicated they were planning to leave the profession also reported feeling isolated from opportunities to work regularly with experienced teachers (Burke et al., 2015). Another study of 77 novice teachers demonstrated that participants perceived higher levels of relational support when they had more time with their mentors (LoCasale-Crouch et al., 2012). Collectively, these studies highlight the challenge that educators in rural school systems face when providing formal mentor support to beginning teachers. Often lacking in personnel resources, rural school educators frequently assign teachers to extra duties, limiting available time in the school day for mentoring interactions. Virtual mentoring might provide a flexible solution for increasing the frequency of interactions that a novice

rural teacher might have with a mentor. More research was needed to understand how virtual mentoring activities might meet the perceived needs of novice, rural teachers.

Novice Teachers' Perceptions of Outcomes of Mentoring

How novice teachers perceive their mentoring support influences the outcomes of mentoring exchanges. First, some studies demonstrate that perceptions of support influence novice teachers' intentions to stay in the profession. In a quantitative study, Jones, Youngs, and Frank (2013) examined how novice teachers perceived the support available to them and how those perceptions impacted their plans to stay in their jobs. They discovered that for novice special education teachers, mentoring support from colleagues highly predicted whether or not the beginning teacher expressed intentions to remain committed to their jobs. Similarly, in a study conducted in Texas, researchers tracked 954 early career teachers for 5 years (Huling et al., 2012). Those novice teachers who participated in a formal mentoring program continued to perceive its merits even after the program ended. Participants who had received formal mentoring were retained at higher rates than their counterparts who had not. Huling et al. concluded that participation in mentoring perceived as helpful has a positive influence on long-term retention of novice teachers.

Second, perceptions of mentoring support influences professional growth for novice teachers. In a study about the role of the mentor in supporting new teachers, LoCasale-Crouch et al. (2012) analyzed data collected from 77 novice teachers over 1 year and found that beginning teachers who perceived more support from their mentoring relationship also reported more reflection on practice and more effective instructional

interactions with students. In a mixed methods study with five novice foreign language teachers in China, Li (2016) explored perceptions of mentoring support. Novices perceived professional growth as a result of mentoring activities, including enhancing skills in critical reflection on practice, aligning teaching to meet students' needs, and fostering general growth in teaching efficacy. As these studies demonstrated, perceptions of mentoring support influenced both attitudes towards retention in the profession and professional development at the beginning of a novice's career.

The research literature related to novice teachers' perceptions of mentoring includes research on how novices perceive their own needs for support, what they perceive are effective mentoring activities and effective qualities of mentoring relationships, and how their perceptions influence attitudes towards retention and growth in autonomous teaching practices. The gap that remained in this literature was how virtual mentoring might support novice, rural teachers by improving mentor matching along common characteristics and increasing helpful mentoring activities that meet the perceived needs of beginning teachers, including their needs for practical help and affective support. This gap is important in rural schools where early career teachers might experience increased levels of professional isolation due to a lack of personnel resources. Although some research findings indicated that novice teachers want a mentor with common characteristics, or a mentor who is available for frequent interaction, little, if any, research has demonstrated that using virtual mentoring to facilitate these types of matches will provide the affective and pragmatic support novices are seeking when mentoring is not conducted in person. This study explored the perceptions of rural,

novice teachers who received virtual mentoring and examined how virtual mentoring influences novices' perceptions of mentoring activities and the qualities of the mentoring relationship.

Review of Virtual Mentoring

Virtual mentoring, sometimes called eMentoring or online mentoring, denotes a mutually beneficial relationship between a mentor and mentee facilitated through electronic communication. Through interactions mediated by DCTs, a more experienced individual helps a novice develop professional capacity. The use of DCTs creates flexibility for the mentoring process, overcoming barriers of time, geography, and culture (Bullock & Ferrier-Kerr, 2014). Virtual mentoring has been successfully implemented in various fields, including health professions (Clement & Welch, 2017; Frahm et al., 2013; Hoffman, Desha, & Verrall, 2011; Lasater et al., 2014), business (Janasz & Godshalk, 2013; Murphy, 2011; Oosthuizen & Perks, 2017) and education (Dabbs & Howard, 2016; Ohlson, Ehrlich, Lerman, & Pascale, 2017). The application of virtual mentoring to teacher induction and teacher professional development has generated numerous studies. These studies can be organized into categories of synchronous virtual mentoring and asynchronous virtual mentoring, providing different benefits and drawbacks for effective teacher mentoring.

Synchronous Virtual Teacher Mentoring

DCTs, such as webcams, Skype, or online chat, allow teachers to connect with more experienced practitioners in real-time. Research on how novice teachers perceive mentoring demonstrates that they value regular contact with their mentors (Burke et al.,

2015; LoCasale-Crouch et al., 2012; Mann and Tang, 2012). DCTs provide the opportunity for synchronous virtual teacher mentoring that supports beginning teachers.

Preservice teachers. Research supports the usefulness of synchronous, virtual mentoring in teacher training programs. With the growth of online teacher education programs, faculty is turning to alternative forms of mentoring preservice teachers during their practicums. In a case study of preservice teachers placed in rural schools, university supervisors used high-definition TelePresence technology for real-time video observation of the student teachers' classrooms (Liu, Miller, Dickmann, & Monday (2018). Liu et al. discovered that the synchronous video observations fostered opportunities for university supervisors to offer constructive feedback on teaching and to create collaborative reflections on practice that strengthened the preservice teachers' instructional competence. Comparing synchronous remote observations to traditional in-person observations of student teachers, Heafner, Petty, and Hartshorn (2011) discovered that candidates observed by synchronous video tools demonstrated the same types of professional growth in content and pedagogical knowledge and skills as their counterparts who were supervised in person. Even though video capture limited the viewing and listening field of the classroom, multiple mentors could observe unobtrusively and provide cross-validation of teaching performance for the candidates, and remote observation provided cost savings for the university. Schwartz-Bechet (2014) found similar results in a study about supervision of preservice teachers. Virtual supervision did not deter preservice teachers from producing pedagogically sound instruction, but the results must be interpreted with caution due to a small sample size.

Like Heafner et al., Gronn et al. (2013) explored utilizing DCTs to remotely supervise student teachers in rural Australian schools. The research team evaluated flip-cameras, M-View, Skype, and Adobe Connect as preservice teacher mentoring tools. Each tool demonstrated different strengths, but regardless of the type of tool, mentees perceived that video capture of their teaching was a significant medium for reflecting on and improving practice. In another study, 21 preservice elementary music teachers also reported that video capture was an important avenue of virtual feedback on teaching (Reese, 2013). The novice music teachers streamed video of their classroom instruction to master teachers in a different location, who then provided feedback during a post-teaching Skype conference. The mentees valued the dialogic inquiry during the conferences and perceived that the feedback was more objective when generated by a mentor who was not a university instructor (Reese, 2013). In addition to receiving feedback on their teaching, participants in this same study also had the opportunity to view master teachers at work. Experienced music teachers recorded videos of their classrooms, shared them with the novices, and discussed them during Skype conferences. Mentees valued this form of modeling for providing insight into pedagogy in action. Reese (2017) conducted a follow-up study, in which three mentors worked with small groups of preservice elementary music teachers. The preservice music teachers captured videos of their classroom instruction, and their mentors provided teaching feedback through Skype chats. Reese analyzed the content of the Skype sessions and discovered that the focus of mentoring conversations was largely related to classroom management and pedagogy. The research of Reese has demonstrated that virtual mentoring can

provide effective synchronous support in helping preservice teachers develop their pedagogy.

Taking synchronous teacher mentoring in a different direction, Rock et al. (2009) pioneered the first "Bug in Ear" (BIE) technology for guiding preservice special education teachers in real-time during their practicums. Extending the initial study from 2009, Rock et al. (2012) equipped 13 graduate special education students with earpieces and webcams for coaching during classroom instruction to receive immediate feedback. Results indicated that this type of synchronous virtual mentoring directly impacted positive interactions between teachers and students and increased use of instructional practices that engaged learners. Mentees perceived that the in situ coaching guided their teaching practices and prompted cycles of reflection that generated important professional insights. A follow-up study demonstrated that BIE synchronous mentoring from the original participants in the 2009 study produced stable improvements in teaching practice, which persisted over time (Rock et al., 2014). This research on BIE technology is an important contribution to the field of virtual teacher mentoring. Through longitudinal research, Rock et al. add important empirical data among numerous exploratory studies of virtual mentoring.

Synchronous virtual mentoring is not only useful for interactions between preservice and master teachers, but it is also useful for peer mentoring among preservice teachers. In a quantitative study, 16 Dutch preservice teachers interacted in a synchronous learning environment to receive peer coaching on videos of their teaching. In the peer-coaching program, Skype was used to facilitate the exchange of feedback, as peers

reviewed teaching videos, engaged in dialogue about solutions and goals, collaborated on action plans, and tested new strategies (Thurlings et al., 2014). Results suggested that peer feedback processes enacted in person are mirrored in the online environment, and that "online synchronous feedback [on teaching] can be as effective as face-to-face feedback" (p. 339).

The body of research on virtual synchronous mentoring of preservice teachers revealed several benefits that align with the framework of this study. Hudson's five-factor model of mentoring, which was the conceptual framework for this study, indicated that transferring pedagogical knowledge, offering feedback, and providing modeling are key actions in the mentoring process. Research has demonstrated that these actions might be possible through virtual means. For preservice teachers, synchronous virtual mentoring provides virtual feedback that fosters similar professional growth as traditional in-person mentoring (Heafner et al., 2011). This feedback can be offered by peers who exchange teaching videos (Thurlings et al., 2014), or by master teachers who view video capture of teaching (Gronn et al., 2013; Reese, 2013; Rock et al., 2012). Research also suggests that for preservice teachers, synchronous virtual mentoring can positively impact growth in pedagogy (Rock et al., 2012; Schwartz-Bechet, 2014) and reflection on practice (Gronn et al., 2013; Rock et al. 2014). Furthermore, synchronous virtual mentoring is an avenue for providing modeling by a master teacher and for facilitating follow-up discussions (Reese, 2013). My study, however, aimed to explore whether or not these mentoring benefits to preservice teachers could also be enacted with in-service teachers in the first 3 years of their careers.

In-service teachers. Besides benefiting preservice teachers, synchronous virtual mentoring also benefits in-service teachers. One hundred and seven beginning teachers from an alternative certification program in Texas participated in synchronous e-coaching sessions via video conferencing over 6 weeks (Anthony, Gimbert, & Fultz, 2013). Quantitative findings indicated that teachers who attended six or more e-coaching segments made significant gains in teacher self-efficacy beliefs during their first year of teaching. In New Zealand, monthly mentoring exchanges via Skype or Adobe Connect contributed to online communities of practice that provided customized support for teachers. Findings also indicated increased self-efficacy to motivate teachers to try new approaches, increased knowledge and skills, and stronger teacher identity contributing to resilience in the face of change (Owen, 2012). Synchronous virtual mentoring can also provide valuable support for practitioners who wish to enhance their skills. Webcam coaching was utilized in a study of 75 kindergarten and first grade teachers across 15 rural schools in Texas when implementing Targeted Reading Intervention (TRI) strategies for literacy instruction (Vernon-Feagans et al., 2013). Biweekly webcam sessions allowed literacy coaches to watch TRI methods in action and work with teachers and students in real-time. Data analysis revealed that webcam coaching correlated significantly with student gains in reading comprehension across a broad range of assessments, efficiently equipping general classroom teachers in effective literacy instruction. Vernon-Feagans et al. noted that webcam mentoring was not only efficient for imparting effective pedagogy, but also provided important professional support for rural teachers, which is a noteworthy finding for my own study. In another study of

teachers seeking to enhance their instructional skills, four high school biology teachers collaborated via Skype and Google chat with a professional biomedical scientist to enact new curriculum (Malanson, Jacque, Faux, & Meiri, 2014). Virtual synchronous support provided guidance for lesson planning and real-time classroom interactions. Data collected and analyzed from students of these teachers exhibited significant gains in knowledge and self-efficacy related to the curriculum concepts. Synchronous virtual mentoring was highly valued by the teachers, providing mentoring across geographical barriers and facilitating cutting-edge curricula.

Asynchronous Virtual Teacher Mentoring

More ubiquitous than synchronous mentoring with video tools is asynchronous teacher mentoring with a variety of computer-mediated communication. As university education programs increasingly incorporate online components to teacher training, preservice teachers have opportunities for asynchronous virtual mentoring. Often this mentoring comes through online platforms such as Blackboard or WebCT, where teaching candidates can engage in discussions to guide their practice. Research findings demonstrate that asynchronous computer-mediated communication aids preservice teachers in transferring ideas about quality teaching into their practice (Allaire, 2015; Ro, Magiera, Gradel, & Simmons, 2013). Bondie (2015) discovered that when preservice, rural, special education teachers used an online platform to receive asynchronous virtual support, they had opportunities to develop instructional competencies as they sought and received feedback on their lesson plans and engaged in subsequent reflection on practice. In a comparison study of preservice teachers participating in online mentoring with those

preservice teachers receiving traditional in-person mentoring, online mentoring had a significant effect size on quality of lessons planned by teacher candidates (Sherman & Camilli, 2014). Online mentoring has the potential to impact more than lesson-planning. In a study about including technology during student teacher supervision, Kopcha and Alger (2011) found that preservice teachers who participated in online discussion forums scored higher on teacher self-efficacy at the end of student teaching. The research of Kopcha and Alger contributes important quantitative data among numerous qualitative studies about preservice teachers' perceptions of virtual mentoring.

In addition to learning management systems such as Blackboard or WebCT, other virtual platforms provide space for dynamic mentoring conversations between novices and experienced professionals. For example, in a Turkish study of 14 first-year teachers and 14 mentors, asynchronous mentoring interactions took place inside of BuddyPress, an open source social network software (Alemdag & Erdem, 2017). Results of the study indicated that both mentors and mentees perceived cognitive and affective benefits from engaging in virtual mentoring, including finding solutions to common teaching problems, reducing feelings of isolation, and creating a support network. Other social networking sites, such as Facebook or Twitter, effectively facilitate asynchronous mentoring. Twitter can foster the formation of communities of practice to mentor novices. Preservice teachers who engaged in Twitter conversations noted the value of the medium for sharing resources and connecting with educators in many contexts, in order to enhance professional growth (Carpenter, 2015; Lord & Lomicka, 2014). Some studies outside of the field of education corroborate the value of social networking for connecting mentors

and mentees. For example, in an international collaboration between university students from Australia and the United States, 20 students in digital media programs used Facebook to create an interactive community for peer mentoring and to connect with professionals in the industry (McCarthy, 2012). Facebook served as a repository for posting images of works-in-progress to receive feedback. Results showed an engaging community of collaboration that connected busy, and often remote, professionals to novices through synchronous and asynchronous communication. McCarthy's study, while not in the field of education, demonstrates how novices and professionals connect virtually in dynamic conversations that enhance mentoring.

Although some researchers suggest that online discussion forums benefit beginning teachers, other researchers have found different results, particularly when participants engage in peer mentoring. In a peer-mentoring study of 155 preservice teachers who participated in threaded discussions about teaching practices via Blackboard, teachers were selective about the source and type of support they pursued, demonstrating a reticence in the large group towards reaching out for information and sharing information (Ruane & Koku, 2014). Jordan (2011) noted a similar caution about the effectiveness of supporting novice teachers through online threaded discussion forums. In a study of 64 beginning teachers, Jordan discovered participants demonstrated a low level of interaction, a finding supported by evidence of communication that did not move the discussion forward. From the data, Jordan concluded that novice teachers lacked pedagogical knowledge and had a narrow view of online discussion, thus limiting the effectiveness of online mentoring through threaded discussion forums. These results,

however, must be interpreted with caution. Jordan collected data during a mandatory new teacher workshop, which might not reflect authentic interactions outside of a training session. Research that Wall, Anderson, and Justice (2014) conducted parallels Jordan's research. In an online community of practice, 31 preservice science teachers engaged in blogging to receive peer mentoring as they reflected on their growing knowledge and emerging teaching experiences. Results indicated that while teaching candidates perceived blogging reduced their sense of isolation, the requirement of blogging limited trust within the online community and mediated the effectiveness of blogging as a tool for professional growth. Hutchison and Colwell (2012) underscored the problem of requiring novice teachers to reflect on practice in online forums. In a qualitative study that they conducted, 26 mentees and their mentors engaged in a wiki community as part of a required new-teacher mentoring program. Data collection and analysis from multiple sources revealed a surprising contradiction in perceptions of the benefit of the wiki page. Data collected and analyzed from wiki pages demonstrated a positive, collaborative environment where teachers exchanged ideas with insight, reflection, and affective support, but data collected and analyzed from individual interviews indicated that wiki pages were too task-driven and impersonal to provide the support that novice teachers were seeking. This contradiction led Hutchison and Colwell to conclude that effectively supporting teachers during induction goes beyond creating an online space for exchanging ideas. More recent research also indicates shortcomings of asynchronous online discussions to adequately support novice teachers (Mitchell, Howard, Meetze-Hall, Hendrick, & Sandlin, 2017). My own study followed a similar research design to

that of Hutchison and Colwell. Not only did I collect data from semi-structured individual interviews with participants, but also from observations of virtual exchanges during the mentoring process, in order to provide a robust picture of the mentoring phenomenon.

Similar to the participants in Hutchison and Colwell's (2012) study, in a study about novice special education teachers in an online mentoring program, Hunt, Powell, Little, and Mike (2013) noted the limitations of eMentoring in providing complete support for these novice teachers. Although beginning teachers had access to a large volume of online resources and their mentors were responsive and knowledgeable, they were not confident that their online mentors, who did not know their specific teaching contexts, could offer the best support. In a similar study conducted in Australia, in which beginning teachers engaged with mentors outside of their schools, Ormond's (2011) findings paralleled the findings from Hunt et al. Mentors perceived that barriers of distance hindered their ability to provide effective behavior management support due to a lack of knowledge of the mentees' specific contexts. The findings from Hunt et al. and from Ormond raise questions about one facet of Hudson's five-factor model of mentoring. According to Hudson (2004), a key dimension of mentoring is initiating the mentee into system requirements or the set of social and professional standards and norms that are unique to a school system. Hunt et al. and Ormond suggested that virtual mentoring is limited in providing complete support for mentoring in system requirements. My research study provided data to further explore whether or not virtual mentoring provided adequate support for mentoring in system requirements.

Even though asynchronous virtual mentoring has drawbacks, a growing body of research suggests that numerous advantages exist. In a case study of eight pairs of mentors and mentees who interacted by email, Ormond (2011) discovered that mentees appreciated the reflective space outside of the school day that asynchronous conversations provided. Mentors also noted the value in the passage of time to provide mentees with a space for reflection to temper emotions and increase independent problem solving. In addition, external mentoring facilitated conversations about sensitive issues with a mentor who was not part of the politics in the school or in a position of authority over the mentee. Mentees perceived that an external mentor could potentially offer advice from a more objective point of view. This finding echoes similar results that Reese (2013) discovered but contradicts other research that notes the limitations of virtual mentoring for providing feedback that aligns with context-specific issues in the new teacher's classroom (Hunt et al., 2013).

On the positive side, virtual discourse in online forums holds the potential to save time and effort in supporting first-year teachers in their construction of knowledge about the teaching profession (Bang & Luft, 2014). In a peer mentoring study in which inexperienced teachers uploaded lesson plans for discussion in online communities of practice, Dorner (2012) discovered that participants perceived an efficient exchange of professional experiences and best practices in the online environment. In another study, Taranto (2011) described perceptions of novice teachers engaged in an online community through a wiki. Participants alleged that the forum provided strong connectedness and opportunities for self-reflection, alongside access to resources and support for improving

instruction. In a study about how novice music teachers share emotions and experiences within an online community, Bell-Robertson (2014) found that Wiki communities also create peer-mentoring spaces where novice K-12 teachers can find emotional support for their daily practice, as they exchange ideas to gain multiple perspectives on teaching issues. The research of Taranto (2011) and Bell-Robertson (2014) on wiki communities seems to contradict the findings of Hutchison and Colwell (2012), but it must be noted that Hutchison and Colwell included teachers who were required to participate in a wiki community. These differing results may indicate that self-selecting virtual mentoring creates different teacher perceptions about mentoring than requiring virtual mentoring. Activities such as online journaling, which are open for peer mentors to discuss, can reduce feelings of isolation and pressures from being new faculty, while spurring beginning teachers to reflect on practice in a safe space (Ramirez, Allison-Roan, Peterson, & Elliott-Johns, 2012). The benefits of online discussion forums are not just for novice teachers; experienced mentors also gain from virtual discourse. In a study about the professional growth of mathematics teachers through online mentoring, McAleer and Bangert (2011) discovered that the more mentors participated in online mentoring discussions, the more they reported enhancing their professional knowledge and skills and subsequently changing their own practices.

For teachers located in rural or remote areas, asynchronous virtual mentoring provides several benefits. In a case study of Australian special education teachers, participants valued mentoring through email exchanges for access to responsive support, particularly in the absence of support in a remote school (Dempsey & Christenson-

Foggett, 2011). In rural Chile, mentoring through email created interactions that allowed isolated teachers to receive explicit and specialized help, while accessing new support networks (Quintana & Zambrano, 2014). Similarly, first-year teachers in remote Australia valued asynchronous virtual mentoring for the quality resources they received to support daily instruction (Cooper et al., 2014). Comparing online training for special education teachers, Erickson, Noonan, and McCall (2012) explored the performance of rural teachers versus non-rural teachers. Rural participants demonstrated an equal level of competence after the 4-week online seminar and perceived that the online delivery of the content was effective for providing important professional development for rural special education teachers. Through the support of the virtual, collaborative community, rural teachers achieved self-identified goals through the training. Reviewing the research literature on virtual teacher mentoring revealed that few studies focused on the impact of virtual mentoring for novice rural teachers. Therefore, this study filled an important gap in research.

Unique Conditions of Rural Schools That Impact the Work of Teachers

Four decades of research on rural education reveals unique conditions that impact the daily work of teachers (Burton, Brown, & Johnson, 2013). These conditions create both strengths and weaknesses for the work of teachers in rural schools, impacting the professional wellbeing of educators. An understanding of the unique attributes of rural schools informs the type of effective support that is offered to teachers in those contexts, particularly novice rural teachers.

Strengths of Rural Education

In a comprehensive literature review of rural education in the United States

between 1970 and 2010, Burton et al. (2013) discovered that rural education fosters

unique strengths. Teachers in rural schools value the closeness of their communities, the

support and positive emotional connection they have with students and families, and the

perception of safety and lack of severe behavior issues among students. In a

phenomenological study of six rural teachers from Indiana, Goodpaster et al. (2012)

found similar results. Close relationships with rural students fostered responsive and

personalized instruction, the benefit of witnessing student cognitive and social

development over time, a sense of safety, and the opportunity to build trust with families

in a manner that enhances student outcomes. Similarly, Eppley (2015) collected

qualitative data from 11 stakeholders in a rural school system in a remote region of the

Northeastern United States in order to understand the perceptions of teachers,

administrators, and community members about rural education. Participants in Eppley's

case study emphasized the importance of shared community contexts of rural schools in

which personal familiarity, often through generations, creates education that is

individualized, rather than standardized. Eppley discovered that the school is a social

center where the community connects, and learning is easily linked to the local context,

because teachers and students share personal and academic connections by pursuing

cultural and relationship opportunities.

Strong community ties to rural schools are not unique to the United States. In a

study of 12 Finnish teachers, Karlberg and Granlund (2011) discovered that rural teachers

remained committed to their jobs in rural schools because of "the solidarity and kinship of the community" (p. 66), which is expressed through a symbiotic relationship between school and community where the school is an important social hub. In addition, Karlberg and Granlund noted the benefits of sustained teacher contact with rural students over time, which provided a responsive curriculum for individual students. The strength of social capital that rural schools can provide also emerged in the research of Lind and Stjernstrom (2015) in Finland, the research of Wenger, Dinsmore, and Villagomez (2012) in Oregon of the United States, and the research of Miller (2012) in the state of New York. Miller (2012) examined quantitative data from 1984-2004 from the New York State of Education Department to find trends in rural education. One significant trend was that rural students consistently outperformed their urban peers.

In addition to close community connections, the structure and organization of rural schools provide advantages. Rural schools consistently have smaller class sizes (Azano & Stewart, 2015; Miller, 2012), which Goodpaster, et al. (2012) noted as an advantage for flexible instruction. In addition, Goodpaster, et al., cited the benefits of small schools for close working relationships among staff, the opportunity for an energizing challenge from a teaching schedule with diverse courses, the flexibility of connecting curriculum to rural life, and perceptions of job security. Broadley (2012) conducted a mixed methods study of 104 teachers and administrators in Australia to explore conditions of 50 schools in remote regions. Broadley's findings concurred with Goodpaster, et al.'s findings that rural teachers valued working collaboratively to learn with and from their colleagues. Furthermore, Jenkins and Cornish (2015) suggested that

the rural context enhances teacher creativity and adaptation, which may not be present in suburban or urban contexts. Masinire (2015) also noted an energy of creative problem solving that can be inherent to rural schools that lack resources.

Challenges of Rural Education

Burton et al.'s (2013) literature review of rural education in the United States over three decades illuminated challenges in rural education that are evident in empirical studies. Burton et al. contended that rural teachers find themselves feeling "professionally distant from resources, colleagues, and professional learning programs" (p.5), with a desire to overcome that obstacle. Berry, Petrin, Gravelle, and Farmer (2011) examined survey data from 203 rural special education teachers in 33 states and discovered that rural special education teachers were eager for more professional development but were impeded by travel, arranging family childcare, and finding a substitute teacher. Broadley's (2012) research in Australia highlighted the same barriers for teachers in 50 remote school districts. Furthermore, Goodpaster, et al. (2012) emphasized the lack of mentoring available to teachers in rural schools, including "insufficient opportunities for peer-peer interactions and collaborations" (p. 18), as well as insufficient connection to professional networks and resources that come from universities. Lazarev, Toby, Zacamy, Lin, & Newman (2017) also described challenges in rural schools related to professional isolation.

In general, rural schools have more limited instructional materials and personnel resources in comparison to their urban and suburban counterparts. In a study of 141 frontier school districts in 42 Montana counties, common problem of rural schools

emerged, which included declining student enrollment and reduced financial resources for schools that impacted programs (Morton and Harmon, 2011). This finding was also evidenced in research conducted in Finland (Lind & Stjernstrom, 2015) and research conducted in Australia (Handal et al., 2013; Cuervo, 2012). A lack of funding often causes educators in school systems to operate multi-grade classrooms (Morton & Harmon, 2011) and increases the daily workload with multiple subjects scheduled (Azano & Stewart, 2015; Goodpaster, et al., 2012; Lazarev et al., 2017). One consequence of these pressures in rural schools is that rural teachers might feel a lack of time to engage in professional learning to improve their practice, even when that professional learning is available to them through online communities (Hunt-Barron, Tracy, Howell, & Kaminski, 2015). Another consequence of a lack of funding is that rural teachers may be forced to teach subjects for which they are not trained (Berry et al., 2011; Burton et al., 2013; Handal et al., 2013; Hobbs, 2013; Willis, Crosswell, Morrison, Gibson, & Ryan, 2017). In a qualitative pilot study, Hobbs (2013) interviewed a total of 23 administrators, teachers, and support staff to explore the experiences of rural Australian teachers who had taught outside of their subject licensure. Hobbs discovered that successfully teaching out-of-field depended on contextual factors of the school, available support mechanisms, and personal resources of teachers. The degree of collegial support that out-of-field teachers perceived impacted their motivation to improve their practice in a content area for which they were not trained. Furthermore, out-of-field teachers valued a range of professional development support over time that they initiated based on personal need. In a mixed methods study of 104 teachers and administrators, Broadley (2012) corroborated

the desire of rural/remote teachers to tailor professional development to enhance their skills and meet the needs of their students.

In addition to professional deficits that rural teachers might experience, a lack of school resources impacts other dimensions of their jobs. Sundeen and Sundeen (2013) explored the implementation of technology in rural schools. They discovered that budget constraints in rural districts limited the amount of technology and access to technical support accessible to teachers in rural schools. Financial pressures created other cutbacks in rural schools, including limited access to supplemental services such as after-school tutoring (Yettick, Baker, Wickersham, & Hupfeld, 2014) or special education services for students with diverse disabilities (Berry et al., 2011; Miller & Hellsten, 2017). Teachers in rural schools often lack access to technology and support services that are commonly expected in urban or suburban contexts (Johnson & Howley, 2015). Rural teachers working in regions with high populations of English-language learners may feel additional challenges from the limited resources available in their school districts (Hansen-Thomas, Richins, Kakkar, & Okeyo, 2014).

Other instructional challenges that rural teachers face involve the characteristics of students, communities, and school cultures. One characteristic of rural students is that they may not have equitable access to technology at home, as their urban and suburban counterparts. Mardis (2013) analyzed United States census data and data from the National Telecommunications Infrastructure Agency and discovered that children in rural areas often lack access to technology outside of the school building, which would support their informal learning. Novice, rural teachers in another study noted that while they had

been trained to use technology in their preservice programs, they were unable to implement lessons with technology in their rural classrooms due to a lack of resources (Manwa, Mukeredzi, & Manwa, 2016). In addition, rural students may come from communities with values that might hinder their learning outcomes (Kartal, Ozdemir, & Yirci, 2017). For example, rural students may lack motivation when they perceive instruction is not relevant to their daily lives (Goodpaster et al., 2012), and may come from backgrounds lacking value in literacy or long-term academic goals (Azano & Stewart, 2015) with low levels of support from their families for encouraging academic achievement (Kartal et al., 2017). Furthermore, the cultures of rural schools create challenges for teachers. Rural teachers may face resistance to their efforts at innovation (Goodpaster et al., 2012) and have to negotiate a complex web of politics due to blurred boundaries between private and professional life in a small community (Jenkins & Cornish, 2015). In a phenomenological study of ten classroom teachers from rural Idaho schools, Vaughn and Saul (2013) discovered that even though participants had a strong sense of responsibility to equip students in their academics and dispositions for life outside of their small communities, teachers felt hindered by their heavy workloads, lack of school funding, low student motivation, and difficult school leadership in order to enact their visions. Other pressures facing rural teachers include federal and state policies that demand elevated levels of student performance without adequate support and resources (Morton & Harmon, 2011). These contextual variables for rural teachers often create challenges requiring additional support.

The challenges of rural school systems may impact teachers' intentions to leave their jobs. Some states attempt to reduce attrition and enhance retention in high-poverty rural schools by offering incentives to stay, but those incentives may be inadequate in fostering long-term teacher retention (Maranto & Shuls, 2012). Handal et al., 2013 conducted a mixed methods study of 191 teachers from 27 remote/rural schools in Australia to explore perceptions of the factors that contributed to the attrition of mathematics and science teachers. Teachers noted their professional isolation as the only teacher in their building in a particular subject area, the lack of opportunities for professional development, the lack of mentorship in their content areas due to small staff size, the pressures of completing administrative tasks in addition to instruction, and the lack of teaching resources. These stressors were more acute for novice teachers, who were compelled to function as experienced professionals.

A number of unique conditions in rural schools impact the work of teachers. Rural schools provide the assets of close relationships between school and between home, as well as among staff, which foster individualized instruction, a flexible curriculum that connects to the rural context, and a network of relationships to support student cognitive and social development (Broadley, 2012; Eppley, 2015; Goodpaster et al., 2012; Karlberg & Granlund, 2011; Lind & Stjernstrom, 2015; Wenger et al., 2012). Sustained teacher-student contact, due to the smaller size of rural schools, provides enhanced student outcomes and positive emotional connections (Karlberg & Granlund, 2011; Miller, 2012). The small size of rural schools also creates an energizing environment for rural teachers to apply creative problem-solving strategies (Jenkins & Cornish, 2015; Masinire,

2015). However, rural schools present challenges to teachers, which may impede their job satisfaction. The small size of rural schools often equates to a lack of instructional materials and personnel resources for teachers (Cuervo, 2012; Handal et al., 2013; Kartal et al., 2017; Lind & Stjernström, 2015; Morton & Harmon, 2011). Rural teachers frequently noted that their professional isolation was due to geographic location. In addition, a lack of funding in rural schools may create adverse working conditions, in which teachers experience an increased workload (Azano & Stewart, 2015; Goodpaster et al., 2012), the possibility of teaching outside of licensure (Berry et al., 2011; Burton et al., 2013; Handal et al., 2013; Hobbs, 2013), a lack of technology (Sundeen & Sundeen, 2013), and a lack of student support services (Berry et al., 2011; Johnson & Howley, 2015; Yettick et al., 2014). In addition to outside pressures from state and federal mandates, characteristics of students, school cultures, and community politics also increase daily stress (Azano & Stewart, 2015; Goodpaster et al., 2012; Jenkins & Cornish, 2015; Morton & Harmon, 2011; Vaughn & Saul, 2013). Although numerous researchers have investigated the conditions of rural schools that impact teachers, few researchers have specifically investigated the experiences of novice teachers in rural schools.

Mentoring Novice Rural Teachers

The small body of research on novice teachers who work in rural schools provides insight into the unique challenges of beginning teachers in those contexts. In a qualitative phenomenology, Sharplin, O'Neill, and Chapman (2011) examined 29 case studies of novice teachers assigned to rural/remote schools in Australia to identify coping strategies

over 15 months. For all participants, conversations were key for processing experiences, receiving feedback, evaluating their performance, and seeking alternative strategies. Support provided at key phases during the first year correlated with whether or not novice teachers were willing to continue with their assignments in rural/remote schools. Particularly, in the middle of the first year, when competence and confidence began to emerge for novice teachers, access to professional development and to structures for providing feedback on their work were especially important. In schools where information was readily available and professional networks already existed, novice teachers engaged in direct-action, problem-solving strategies. Novice teachers in rural schools without these protective structures demonstrated more coping strategies, and even turned to avoidant strategies, such as substance use and absence from work.

As noted previously, educators in rural or remote schools often lack the manpower to staff all programs, and novice teachers may be called upon to teach large class loads and handle co-curricular responsibilities, a source of stress noted by 30 novice, rural teachers in a qualitative study in Zimbabwe (Manwa et al., 2016). In addition, rural teachers often instruct curriculum that is outside of their teaching licensure. Novice, rural teachers with heavy course loads outside of their licensure may experience feelings of being overwhelmed and frustrated, and feel compelled to work hours outside of the school day to cope with the pressure (Willis et al., 2017). A teaching assignment outside of licensure creates a unique adverse impact on novice, rural teachers, necessitating special support for those teachers. Using the same pool of cases from a previous study, Sharplin (2014) explored the problem of novice, rural teachers who are

assigned to roles outside of their fields of training and discovered that teaching outside of

an area of licensure impeded the development of confidence in novice teachers, leaving

them feeling professionally alienated in their school cultures, lacking a sense of

autonomy, experiencing low regard among their colleagues, and feeling frustrated by not

using their best skill sets at work. Those teachers who coped well with being assigned to

subjects outside of their field of training demonstrated a willingness to increase their

professional knowledge and retained a sense of self-efficacy. Pursuit of professional

development was critical for supporting novice teachers working outside of licensure.

Fry and Anderson (2011) also noted the importance of supporting the

development of self-efficacy in novice rural teachers. In a qualitative study with four

teachers in rural Montana schools who had changed careers, Fry and Anderson found that

the ability to identify teaching success early in the first year was key to quickly

developing self-efficacy. Participation in mentoring correlated with the ability to identify

success, although no statistical analysis was performed.

The research of Hellsten et al. (2011) corroborated Fry and Anderson's (2011)

discovery that mentoring is key for novice rural teachers. Through qualitative data

collected from eight novice teachers in the Canadian province of Saskatchewan, Hellsten

et al. highlighted the social, professional, and geographical isolation of participants'

remote communities that impacted their privacy and access to teaching resources and

daily amenities. In such an environment, novice teachers emphasized the critical need for

teacher mentoring to reduce professional isolation. As participants noted, professional

connections both within the community and outside of the community were important.

Not all novice teachers, however, work in rural school systems with effective mentoring systems. In a qualitative study, Mukeredzi and Mandron (2013) studied 14 student teachers in rural South Africa. Their results indicated that a lack of regular professional support within a school building impacted the motivation levels of some of the novice teachers. However, participants in the study also valued collaborative reflective sessions with university mentors outside of their schools, as space for professional learning, advice seeking, exchange of ideas, and reflection on practice. Thus, the findings of Mukeredzi and Mandron (2013) and Hellsten et al. (2011) demonstrated that effective support for novice teachers in rural schools does not need to come from within the school building.

The professional isolation that accompanies many rural schools creates distinctive challenges for novice teachers. A handful of qualitative studies demonstrate that professional conversations and access to professional development can provide critical support to novice, rural teachers (Sharplin et al., 2011), particularly for those individuals who are assigned to teaching outside of their licensure (Sharplin, 2014). Mentoring of novice, rural teachers can reduce professional isolation (Hellsten et al., 2011), enhance the development of self-efficacy (Fry & Anderson, 2011), and sustain teaching motivation (Mukeredzi & Mandron, 2013). Rural novices perceive that mentors do not necessarily need to come from within the school system where they are employed (Hellsten et al., 2011; Mukeredzi & Mandron, 2013). These findings open the possibility that virtual mentoring might be helpful for novice, rural teachers, but no research has addressed whether or not virtual mentoring is a suitable substitute for in-person

mentoring of beginning rural teachers. Furthermore, even though Sharplin et al. (2011) found that professional conversations are key for helping rural, novice teachers process experiences, receive feedback, evaluate their performance, and seek alternative strategies, few, if any, researchers have found that virtual mentoring sustains these kinds of important conversations. A review of the research literature related to supporting novice, rural teachers established a need for increased research about providing mentorships through virtual channels.

Summary and Conclusions

In summary, this chapter included a review of research related to new teacher mentoring, virtual mentoring, and the unique conditions of rural schools that impact the work of teachers. An overview of new teacher mentoring at the beginning of the chapter demonstrated that new teacher induction programs with mentoring components have been on the rise in the United States, generating over three decades of research about effective new teacher mentoring (Ingersoll, 2012; Ingersoll & Strong, 2011). To organize current research about new teacher mentoring, Hudson's five-factor model provided a framework for a detailed literature review. Specific topics addressed in this literature review included (a) the role of mentor attributes in mentoring, (b) the role of pedagogical knowledge in mentoring, (c) the role of modeling in mentoring, (d) the role of feedback in mentoring, (e) the role of system attributes in mentoring, (f) novice teacher perceptions of mentoring, (g) synchronous and asynchronous virtual mentoring, (h) strengths and challenges of rural education, and (i) mentoring novice rural teachers.

Several themes emerged through this literature review. First, in the past five years, the body of research related to virtual teacher mentoring was much smaller in scope than studies related to in-person mentoring. A search for studies on virtual mentoring prior to the past 5 years also yielded a small number. Even though DCTs have been widely available for nearly two decades, the research on the application of these tools during new teacher mentoring was limited. Consequently, my study contributed to a growing body of research on innovative new teacher mentoring where a gap was found. A closer examination of the studies related to virtual mentoring also revealed several trends that were important to my study. Research evidence exists that the application of DCTs to mentoring interactions brings benefits to early career teachers, regardless of whether or not they are applied synchronously or asynchronously. Research indicated that using DCTs to support mentoring interactions produces some of Hudson's five factors of effective in-person mentoring. For example, DCTs allow for exchanging virtual feedback on teaching (Gronn et al., 2013; Heafner et al., 2011; Reese, 2013; Rock et al., 2012; Thurlings et al., 2014), for fostering growth in pedagogy (Gronn et al., 2013; Rock et al., 2014; Rock et al., 2012; Shwartz-Bechet, 2014), and for facilitating modeling by a master teacher (Reese, 2013). Some of the research, however, demonstrated that virtual mentoring might limit the factors of Hudson's model. According to Hudson, inducting a new teacher into the system requirements of the profession is important, but research from Hunt et al. (2013) and Ormond (2011) suggested that DCTs could not facilitate complete support in mentoring in system requirements if the mentor does not teach in the

same system as the novice teacher. More research was needed to explore how DCTs impact effective mentoring for the five factors of Hudson's model.

Second, the literature review revealed themes about the unique conditions of rural schools that impact the work of novice teachers. Professional isolation as a result of geographical isolation (Handal et al., 2013; Lind & Stjernstrom, 2015), limited funding and resources (Azano & Stewart, 2015; Goodpaster et al., 2012), and increased workloads (Burton et al., 2013; Handal et al., 2013; Hobbs, 2013) create pressures for beginning teachers, and research shows that mentoring support can alleviate some of those pressures (Hellsten et al., 2011). Findings from a few studies suggested that novice rural teachers receive effective support from a mentor who works outside of their school buildings (Hellsten et al., 2011; Mukeredzi & Mandron, 2013), but few, if any, studies demonstrated that virtual mentoring is effective for helping novice rural teachers when they work with a veteran teacher who does not share geographical proximity. A significant gap remained about whether or not the benefits of virtual mentoring emerge when novice rural teachers interact with a veteran teacher using DCTs.

Finally, a review of current research related to each of Hudson's five factors of effective mentoring yielded themes that informed this current study. The majority of current research related to Hudson's factors of new teacher mentoring has been conducted with participants who interacted in-person. The gap that remained in the research literature was whether or not virtual mentoring creates an environment that is conducive to fostering similar dispositions and similar mentoring activities that Hudson

claims provide a foundation for effective mentoring or if virtual mentoring might provide additional factors not previously studied during in-person mentoring interactions.

In this chapter, I describe my literature search strategy, discussed the conceptual framework of this study, and provide a detailed literature review of new teacher mentoring, virtual mentoring, and conditions of rural schools. In the next chapter, I discuss the research methodology for this case study. I explain the research design and rationale and the role of the researcher. I also address issues of trustworthiness related to credibility, transferability, dependability, and confirmability, as well as describe ethical procedures.

Chapter 3: Research Method

The purpose of this qualitative study was to explore how virtual mentoring of novice rural teachers reflected Hudson's (2004a) five-factor model of mentoring in virtual mentoring exchanges. The overall purpose of this case study was to explore how DCTs could be used to provide virtual mentoring for novice rural teachers. To accomplish that purpose, I used interviews and reflective journals to describe how novice rural teachers and their mentors reported the virtual mentoring experience. In addition, I examined archival data of asynchronous mentoring exchanges to describe how novice rural teachers and their mentors interacted during the virtual mentoring process.

Chapter 3 is about the research method that I used for this study. In this chapter, I describe the research design, research rationale, and the role of the researcher. In addition, I discuss the methodology in relation to participants, instrumentation, and data collection and data analysis plans. I also discuss issues of trustworthiness and ethical considerations related to this qualitative research.

Research Design and Rationale

In this section, I present the research questions for this qualitative study, describe the central phenomenon of the study, and provide a rationale for the methodology of this study. The central and related research questions were aligned with the conceptual framework and the literature review for this study.

Central Research Question

How does virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a) five-factor model of mentoring?

Related Research Questions

1. How do novice rural teachers describe the virtual mentoring experience?

2. How do mentors of novice rural teachers describe the virtual mentoring experience?

3. How do novice rural teachers and their mentors interact during the virtual mentoring process as revealed in archival data?

Rationale for Research Design

The research design for this study was a single embedded case study. Yin (2014) defined case study as "an empirical inquiry that investigates a contemporary phenomenon in depth and within its real world context" (p. 16). Yin noted that case study research "copes with the technically distinctive situation in which there will be many more variables of interest than data points" (p. 17). Thus, a case study design provides rich data collected in a real life context from multiple sources.

A case study research design offered several unique characteristics that were relevant to this study. First, Yin noted that case study research is particularly suited for answering research questions that pursue *how* or *why*. Second, Yin stated that case study research is particularly appropriate for a contemporary phenomenon examined within its real-world context, in which the conditions of the context are likely to be significant for the study. In the single-embedded case study design, embedded units of analysis were selected from the same context to provide a rich description of a central phenomenon or case (Yin, 2014). Virtual mentoring is a contemporary phenomenon that is emerging as a trend in professional development (McConnell, et al., 2013). Therefore, for this study,

the phenomenon of virtual mentoring was examined as it happened during mentoring exchanges facilitated by the NTS program at the Mentoring Institute. Third, Yin noted that case study research explores multiple variables through the triangulation of multiple sources of data. One of the goals of this study was to examine a virtual mentoring program from multiple perspectives using multiple sources of data drawn from multiple units of analysis within a single case. Fourth, case study research was a relevant design for this study because the research was clearly bounded by time and place. This study was limited to rural teachers who received mentoring support facilitated by the NTS program, and who were in the first 3 years of their teaching career.

Consideration of Other Designs

Several other designs were considered for this study, including phenomenology, grounded theory, and ethnography. Creswell (2013) defined phenomenology as a qualitative method that describes "the common meaning for several individuals of their lived experiences of a concept or phenomenon" (p.76). The purpose of this study was to explore how virtual mentoring of novice rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring, and therefore, the perceptions of a group of individuals who have experienced virtual mentoring were one of the data sources; however, Creswell noted that typically in phenomenology this group is heterogeneous with a common shared experience. This study, in contrast, examined a homogeneous group of rural teachers in the first one to three years of their careers. Furthermore, Creswell indicated that phenomenology, as a research design, is useful when it is important to "develop a deeper understanding about the features of the phenomenon" (p.

81). The purpose of this study, however, was not to describe the phenomenon of virtual mentoring with novice rural teachers; rather, the purpose of this qualitative case study was to explore how virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a) five-factor model of mentoring.

Grounded theory was also considered as a possible research design. Creswell (2013) defined grounded theory as a qualitative method that aims to "generate or discover a theory…for a process or an action" (p. 83). Grounded theory was not a suitable approach either, because the purpose of this study was not to develop a theory about virtual mentoring that is grounded in the data. Rather, the theoretical propositions for this study were already outlined in Hudson's (2004a) five-factor model of effective mentoring. Data were collected, not to uncover a new theory, but rather to explore how elements of effective mentoring emerged in virtual interactions between a novice and a veteran teacher and if these elements reflected Hudson's model.

Ethnography was also considered as a research design. Creswell (2013) defined ethnography as a qualitative method that "focuses on an entire culture-sharing group" in order to describe and interpret "the shared and learned patterns of values, behaviors, beliefs, and language" of the group (p. 90). However, this design was not appropriate for this study because the participants of the study did not share enough common characteristics that might identify them as a culture-sharing group. Rather, participants were selected for some of their diverse characteristics to provide for more robust data analysis.

Role of the Researcher

As the single researcher for this single case study with embedded units of analysis, I assumed several roles. For this qualitative study, I served as an observer who was the primary investigator, acting as the primary instrument for data collection and analysis (Merriam & Tisdell, 2016). This role involved planning the research design for the study, selecting participants, determining data sources, and creating tools for collecting data. As the primary investigator, I was also responsible for developing the procedures for recruiting participants, collecting and analyzing data, and utilizing strategies that strengthened the trustworthiness of this qualitative research.

As the single researcher for this study, the danger for potential bias in data collection and analysis existed. In order to minimize this potential bias, I used specific strategies to improve the trustworthiness of this qualitative research that I described later in this chapter. In addition, my role as researcher did not conflict with my present position as an education consultant at a local intermediate school district (ISD) in the Midwestern region of the United States because none of the participants were recruited from this district. Participants were recruited through the NTS program at the Mentoring Institute. The ISD with which I am affiliated does not offer virtual mentoring programs for novice rural teachers; therefore, they could not be a source of participants for this study.

Methodology

The methodology section provides details about how the research was conducted. In this section, I shared information about inclusion criteria for participants and the types

of instruments I used to collect data through interviews, reflective journals, and archived online mentoring interactions. I also described procedures for recruiting participants, selecting participants and collecting data.

Participant Selection Logic

One case was examined for this study, and within that case, two embedded units of analysis or mentoring pairs were selected to explore the phenomenon or case of the virtual mentoring program at the Mentoring Institute. Participants were recruited by using the strategy of purposeful sampling. Participants for this case study included two virtual mentoring pairs comprised of one novice rural teacher and one experienced teacher who interact using DCTs, for a total of six participants. Two virtual mentoring pairs, or a total of four participants, are comparable to a similar case study that Bang and Luft (2014) conducted, who collected data from two virtual mentoring pairs, or four participants, to explore the phenomenon of virtual mentoring. In case study research, Yin (2014) noted that the number of participants in qualitative research is often small in order to obtain in-depth responses and because data are also collected from other sources in order to explore multiple variables. In order to obtain the richest data possible, participants were purposefully selected from the NTS program at the Mentoring Institute. The NTS program provides online mentoring to support the professional development of novice teachers by pairing one novice teacher with one experienced teacher who are matched by grade level or subject expertise.

Inclusion criteria. Participants were selected according to specific inclusion criteria. Novice teachers needed to meet these inclusion criteria: (a) must be employed

full-time in the first 3 years of their teaching careers, (b) must teach in a rural school located more than 10 miles from an urban cluster with a population of 2,500 to 50,000 people (National Center for Education Statistics, 2006), (c) must receive primary support from an assigned virtual mentor, (d) must be from different schools, and (e) must communicate with the mentor using DCTs for the purpose of receiving teaching support. Experienced teachers needed to meet these inclusion criteria: (a) must have a minimum of 7 years of teaching experience, (b) must be matched with a novice teacher because of shared grade level or content area, and (c) must communicate with the mentee using DCTs to offer teaching support. Seven years of teaching experience aligned with Feiman-Nemser's (2001) views of the stages of professional development of teachers. According to Feiman-Nemser, "achieving initial mastery…of conventional teaching…requires five to seven years" (p. 1039), at which time a teacher reaches a level of professional stabilization and mastery.

Instrumentation

For this single embedded case study, I designed three types of instruments: (a) interview guides, (b) reflective journal prompts, and (c) archival data collection forms. These instruments were aligned with the research questions, and an expert panel of two or three colleagues with advanced degrees in education reviewed the alignment of these instruments to the research questions.

Interview guides. The interview guides for this study were based upon the recommendations that Merriam and Tisdell (2016) presented in relation to conducting effective interviews for qualitative research. According to Merriam and Tisdell,

interviews allow a researcher to access the perceptions of participants and to understand details about a phenomenon that cannot be readily observed. Interviews also provide data about participants' memories of past events and about how they interpret their experiences.

For this qualitative research, the interview guides included two parts: a demographic questionnaire for participants and semi-structured interview questions (see Appendix C). Semi-structured interviews were conducted with virtual mentors and novice rural teachers who engaged in a mentoring relationship by using DCTs. Merriam and Tisdell (2016) suggested that semi-structured interviews provide a framework for examining a phenomenon and encouraging participants to discuss their experiences in detail. In this type of interview, a mix of structured and less structured questions is prepared to allow the researcher to respond to the participant as the interview unfolds. A list of questions is prepared, but the order and wording might change during the interview. For my interviews, I prepared questions but remained flexible in using follow-up probes when I needed clarification of participants' responses. Tables 4 and 5 capture the interview questions I used with novice teachers and with experienced teachers. Appendix C is the interview guide, which includes demographic and interview questions.

Table 4

Alignment of Novice Teacher Interview Questions with Research Questions

Interview Question	CRQ	RRQ1	RRQ2	RRQ3
NTIQ1: Virtual mentoring is when a mentor and mentee interact by using digital communication tools because they are unable to meet in person. What activities are part of your virtual mentoring?	X	X		
NTIQ2: How would you describe the mentoring support you receive from your virtual mentor?	X	X		
NTIQ3: As a new teacher, what types of virtual mentoring support do you believe have been the most beneficial to you?	X	X		
NTIQ4: As a new teacher, what types of mentoring support do you wish you had more of?	X	X		
NTIQ5: If I were a new teacher wanting to receive support through virtual mentoring, what would you tell me were the reasons to participate?	X	X		
NTIQ6: What are the advantages of virtual mentoring? Are any of those advantages unique to virtual mentoring? If so, which ones?	X	X		
NTIQ6: Please describe the elements of virtual mentoring that make it challenging to receive quality mentoring.	X	X		
NTIQ7: Is there anything else about your experiences with virtual mentoring that you would like to share?	X	X		

Reflective journal questions. The reflective journal questions followed the interviews (see Appendix E). Each mentee and each mentor provided written reflections about their virtual mentoring interactions. The purpose of the reflective journal questions was to explore in-depth the participants' experiences with each of Hudson's (2004a) five factor mentoring model as a result of their virtual mentoring exchanges. Tables 6 and 7 capture the reflective journal questions that I used with novice and experienced teachers.

Table 5

Alignment of Mentor Interview Questions with Research Questions

Interview Question	CRQ	RRQ1	RRQ2	RRQ3
MTIQ1: Virtual mentoring is when a mentor and mentee interact by using digital communication tools because they are unable to meet in person. What activities are part of your virtual mentoring?	X		X	
MTIQ2: How would you describe the mentoring support you offer your mentee?	X		X	
MTIQ3: As a mentor, what types of mentoring support do you believe are most beneficial to a new teacher? How does virtual mentoring encourage you to offer that type of support? What elements of virtual mentoring make it challenging to be an effective mentor?	X		X	
MTIQ4: What are the advantages of virtual mentoring? Are any of those advantages unique to virtual mentoring? If so, which ones?	X		X	
MTIQ5: If I were an experienced teacher wanting to participate in virtual mentoring, what would you tell me were the reasons to participate?	X		X	
MTIQ6: Is there anything else about your experiences with virtual mentoring that you would like to share?	X		X	

Table 6

Alignment of Novice Teacher Reflective Journal Questions with Research Questions

Reflective Journal Questions	Hudson's Factor	CRQ	RRQ1	RRQ2	RRQ3
NTRJQ1: How would you describe your mentor? What personal characteristics about your mentor have helped or hindered your professional growth?	Personal Attributes	X	X		
NTRJQ2: How has your mentor offered guidance that has helped you to improve your teaching practice?	Pedagogy	X	X		
NTRJQ3: In what ways has your mentor modeled effective teaching practice to you?	Modeling	X	X		
NTRJQ4: How has feedback been a part of your mentoring interactions?	Feedback	X	X		
NTRJQ5: One of the ways that a mentor can help a new teacher is to guide them in understanding the professional requirements of teaching. These requirements might include understanding curriculum mandates, school policies, and/or professional standards. Describe how your mentor has helped you understand the professional requirements of teaching.	System Requirements	X	X		
NTRJQ6: Think about your relationship with your virtual mentor. What three words describe that relationship? Please provide an example to support each word choice.		X	X		

Table 7

Alignment of Mentor Reflective Journal Questions with Research Questions

Reflective Journal Questions	Hudson's Factor	CRQ	RRQ1	RRQ2	RRQ3
MTRJQ1: What skills and knowledge from your own teaching practice have you shared with your mentee to help him or her improve instructional practice?	Pedagogy	X		X	
MTRJQ2: How have you modeled effective teaching practice to your mentee?	Modeling	X		X	
MTRJQ3: How has feedback been a part of your mentoring interactions?	Feedback	X		X	
MTRJQ4: One of the ways that a mentor can help a new teacher is to guide them in understanding the professional requirements of teaching. These requirements might include understanding curriculum mandates, school policies, and/or professional standards. Describe how you have helped your mentee understand the professional requirements of teaching.	System Requirements	X		X	
MTRJQ5: How would you describe yourself as a virtual mentor? What personal characteristics do you feel you can offer to mentees to support their professional growth through virtual mentoring?	Personal Attributes	X		X	
MTRJQ6: Think about your relationship with your mentee. What three words describe that relationship? Please provide an example to support each word choice.		X		X	

Archival data collection form. Merriam and Tisdell (2016) identified personal

documents collected from online sources as a possible type of data for qualitative

research. As they noted, personal documents are "like observations in that [they] give us a snapshot into what the author thinks is important, that is, their personal perspectives" (p. 166). These types of documents "are a good source of data concerning a person's attitudes, beliefs, and view of the world" (p. 166). For my study, online asynchronous discussion groups posted on discussion boards provided personal documents that captured mentoring interactions during one academic year. These discussion posts were archived in the NTS virtual mentoring platform and documented interactions among mentors and novice teachers. Table 8 captures how the archival data aligned with the research questions of this study. Appendix D shows the archival data collection form I used to collect data from asynchronous conversations among the mentors and novice teachers.

Table 8

Alignment of Archival Data Collection Form with Research Questions

Criteria	CRQ	RRQ1	RRQ2	RRQ3
Purpose of Interaction				X
Topics/Content of Interaction				X
Use of Interaction				X
Personal Attributes of Mentor	X			
Pedagogical Content Knowledge	X			
Modeling	X			
Feedback	X			
System Requirements	X			

Procedures for Recruitment, Participation, and Data Collection

The following sections in this proposal explain how I recruited participants, how they participated in the study, and how I collected data.

Recruitment and participation. Concerning recruitment, I partnered with the Mentoring Institute to find participants from a virtual mentoring program called NTS. The NTS program offers support to novice teachers by matching them with experienced teachers who share common grade levels or content areas. I contacted the vice president of educational technology at the Mentoring Institute to explain the purpose of this study and obtained a signed letter of cooperation (see Appendix A). The letter of cooperation explained the purpose of this study and invited the Mentoring Institute to be a research partner. After the Mentoring Institute agreed to be a research partner with me, then the vice president assisted me in finding names and contact information for novice teachers and their mentors who meet my inclusion criteria. The Mentoring Institute also signed a Data Use Agreement with me.

Concerning participation, I purposefully selected two mentoring pairs, based upon my inclusion criteria. Because of the Mentoring Institute's policies about protecting their own program participants, they sent email invitations to individuals whom they believed met my inclusion criteria (see Appendix B). Those who received invitations and expressed interest in participating in the study were emailed a consent form with details about the study. I selected the first two novice teachers and their assigned virtual mentors who both return signed consent forms to me as the mentoring pairs for this study. I then contacted each of the participants by email to discuss the data collection process.

Data collection. In relation to data collection, I collected data from multiple sources, including interviews with each participant, reflective journals, and archival data from asynchronous discussion boards of virtual mentoring exchanges. Yin (2014)

emphasized the value of "converging lines of inquiry" in case study research (p. 120). As Yin noted, "multiple sources of evidence…provide multiple measures of the same phenomenon" (p.121), which strengthens the findings. The data collection processes for these sources of data are explained below.

Interviews. Participants were asked to participate in a 30 to 45-minute interview, that I audio-recorded to ensure accurate transcription. I conducted these interviews by phone or by Skype and scheduled them at the convenience of participants. Participants received a copy of the interview questions and a demographic questionnaire prior to the interviews. Participants were also informed that follow-up questions might be used to probe for more in-depth responses as needed.

Reflective journals. At the end of the interviews, I explained the data collection procedures for the reflective journals. I emailed the reflective journal questions to all participants within a week of completing the interviews. Participants emailed their responses to the reflective journal questions to my Walden University email address. I copied their email responses to the reflective journal prompts into Word documents for data analysis.

Archival data. Archival data collected from asynchronous online mentoring exchanges provided documentation of virtual mentoring interactions for participants in my study. I collected this archival data from the NTS online mentoring system for each mentoring pair. The archival data were gathered from each weekly discussion posted in the online forum over the course of the academic year 2016-2017. I copied these asynchronous conversations into Word documents for data analysis.

Data Analysis Plan

The single case for this study was a virtual mentoring program. The embedded units of analysis in that context were two mentoring pairs of one novice teacher working at a rural school and one experienced teacher. For this single embedded case study, I first conducted an analysis of the data that I collected for each unit of analysis or from each mentoring pair. I examined interview responses, reflective journal responses, and archival data of asynchronous discussion posts for each mentoring pair, or unit, to create a record for each unit of analysis. Tables 4 through 8 show how the data connect to the specific research questions of this study. For each data source, I transcribed the audio-recorded interviews by typing them in Word documents, and then I carefully checked and corrected the transcription to ensure accuracy. I transferred emails with reflective journal questions and archival data from the asynchronous discussion posts into Word documents. Collectively, these Word documents that included transcriptions of the interviews, reflective journals, and archival data created the record for each unit of analysis.

For my analysis of the two embedded units of analysis, I coded the interview, reflective journal, and archival data transcripts using line-by-line coding, a strategy that Charmaz (2011) recommended "to bring the researcher into the data, interact with it, and study each fragment of it" (p.368). During this open coding, I looked for in vivo codes and used Hudson's (2004a) five-factor model of mentoring to determine a priori codes. I continued coding the interview, reflective journal, and archival data using axial coding that Merriam and Tisdell (2016) recommended. Axial codes emerged as I reflected on

and interpreted meanings to identify common themes and patterns that aligned with the purpose of my study. Both initial and axial coding of interviews and reflective journals were conducted using line-by-line coding in Word documents and Excel spreadsheets. Throughout the coding process, I constructed memos by reflecting on the data. This coding for each embedded unit of analysis resulted in the construction of "categories or themes that capture some recurring pattern that cuts across [the] data" (Merriam & Tisdell, 2016, p. 207).

The second level of analysis involved examining the categorized data across both units of analysis for emerging themes and discrepant data that informed the results for this study. The results were analyzed according to the central and related research questions. Yin (2014) suggested that theoretical propositions are useful for interpreting the findings, and for this single embedded case study, the theoretical proposition for my research originated in Hudson's framework for mentoring. The theoretical proposition was that elements of Hudson's model of mentoring would be reflected in the virtual mentoring process. Hudson's model provided a conceptual lens for interpreting the data, but interpretation was not limited to Hudson's model. I also referred to the literature review related to this study to interpret the findings of this study.

Issues of Trustworthiness

Providing evidence of trustworthiness for qualitative research is important because the qualitative researcher aims to increase understanding of a particular phenomenon. Readers of a study wish to know if the findings are an authentic representation of reality because, as Merriam and Tisdell (2016) suggested, offering

evidence for the rigor of a study increases the usefulness of the findings for influencing

"the practice or the theory of a field" (p. 238). In case study research, Yin (2014) noted a

few practices that can increase trustworthiness: (a) aim for accuracy, (b) examine and

divulge the "needed methodological qualifiers and limitations to one's work" (p. 77), and

(c) carefully consider how to strengthen the internal validity of the study. In the following

sections I describe how I increased the trustworthiness of this study in relation to the

constructs of credibility, transferability, dependability, and confirmability or objectivity.

Credibility

In qualitative research, Merriam and Tisdall (2016) defined credibility as the

condition in which the findings of a research study are congruent with reality, based upon

the data that are presented (Merriam & Tisdell, 2016). Miles, Huberman, and Saldana

(2014) noted that credible qualitative study presents an account that "rings true, makes

sense, seems convincing or plausible, and enables a vicarious presence for the reader" (p.

313) through findings that are "clear, coherent…and unified" (p. 313). Merriam and

Tisdell recommended that qualitative researchers use the following strategies to improve

the credibility of qualitative research: (a) triangulation of data from multiple sources, (b)

member checks, (c) adequate engagement in data collection, (d) searching for discrepant

data, and (e) peer review.

For this study, I used the strategy of triangulation to improve the credibility of this

qualitative research by comparing and contrasting the settings, participants, and data

collected from two embedded units of analysis within a single case. I used the strategy of

member checks by asking participants to review the emerging findings for their

credibility. Furthermore, I searched for discrepant data as a way of "purposefully looking for variation in the understanding of the phenomenon" (Merriam & Tisdell, 2016, p. 248). Finally, I used the strategy of reflexivity by writing memos in a researcher's journal during data collection and analysis about how my biases, dispositions, and assumptions interacted with my research and how I addressed them.

Transferability

Merriam and Tisdell (2016) defined transferability as "the extent to which the findings of one study can be applied to other situations" (p.253). To enhance transferability of a study, Merriam and Tisdell noted that providing rich, thick descriptions of the setting, participants, and findings of the study will allow readers to draw conclusions of applicability to other situations. Miles et al. (2014) also noted that transferability is enhanced when a qualitative researcher considers how the diversity of the sample might increase applicability and by making transparent any limitations inherent to the sample selection.

In order to strengthen transferability, I used the strategy of providing rich description of the participants, their mentoring interactions, and the NTS program. I selected novice teachers from different rural schools to increase the likelihood that the results could apply to a variety of mentoring programs in rural schools. Furthermore, I reported limitations in my sampling in Chapter 4. I also used the strategy of variation in the sample by selecting novice rural teachers from different schools.

Dependability

Reliability, or dependability, according to Merriam and Tisdell (2016), is "the extent to which research findings can be replicated" (p. 250). As Merriam and Tisdell noted, dependability in qualitative research is enhanced by consistent methods of using data collection instruments across participants and settings. Dependability is also strengthened when the results of a study are consistent with the data that were collected. Merriam and Tisdell recommend these strategies for strengthening dependability: (a) triangulation, (b) peer review, (c) researcher reflexivity, and (d) an audit trail. For this study, I used triangulation by comparing multiple data sources. As I collected and analyzed data, I also used the strategy of reflexivity by writing memos in a researcher's journal to examine my beliefs, assumptions, and biases about virtual mentoring. I also used the strategy of an audit trail by documenting the details of how the data were collected, analyzed, and interpreted. In addition, the audit trail included reflections, questions, and decisions I made during the research process. Finally, the appendices of the study included letters of cooperation, participant consent forms, and data collection instruments.

Confirmability

In qualitative research, confirmability is the counterpart to objectivity. Miles et al. (2014) suggested several strategies for enhancing confirmability in qualitative research: (a) provide explicit, detailed description of a study's methods and procedures, (b) demonstrate how conclusions align with collected data, and (c) document how the researcher has examined and addressed personal assumptions, values, and biases during

the investigation. Merriam and Tisdell (2016) asserted that a qualitative researcher should clarify his or her position during the investigation so that the reader can "better understand how the individual researcher might have arrived at the particular interpretation of the data" (p. 249) and to demonstrate how the researcher's values and expectations "influenced the conduct and conclusions of the study" (p. 249). For this study, I strengthened confirmability by using a researcher's journal to reflect on my biases during data collection and analysis. I also prepared a careful audit trail that described data collection and analysis procedures and reported my findings in a manner that made the relationship between collected data and conclusions transparent to the reader.

Ethical Procedures

The trustworthiness of qualitative research depends on the ethics of the researcher. Because the researcher is the primary instrument of data collection and analysis in a qualitative study, Merriam and Tisdell (2016) believed that it is the responsibility of the researcher to conduct the study in as ethical a manner as possible in order to strengthen the credibility and reliability of the research. Merriam and Tisdell also noted that, "the trustworthiness of the data is tied directly to the trustworthiness of those who collect and analyze the data, and their demonstrated competence" (citing Patton, 2015, p. 260). Merriam and Tisdell suggested that a primary area of ethical consideration in qualitative research lies in the researcher-participant relationship, which impacts the collection of data and the reports of findings. The researcher-participant relationship can be impacted in three important ways: (a) how the researcher reveals the purpose of the

study, (b) how the researcher handles informed consent, and (c) how the researcher handles privacy and protection from harm for the participants.

In terms of ethical procedures for this case study, I submitted an application to the Institutional Review Board (IRB) at Walden University in order to collect data for this study. The IRB approval number for this study was 05-22-217-0385038. First, I addressed the ethical concern about transparency by sending an invitation letter to potential participants explaining that the purpose of this study would be to explore how virtual mentoring of novice rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring. Next, I addressed the ethical concern of informed consent and of privacy and protection from harm by asking all participants to sign a consent form if they were interested in participating in the study. The consent form outlined the voluntary nature of participation in the study and described the procedures for ensuring privacy and confidentiality. The consent form also described how I kept their responses confidential by using pseudonyms. In the form, I also presented details about data collection procedures, and I explained to participants that they would have the opportunity to review tentative findings. The consent form I included an explanation that participants are free to opt out of the study at any time and a description of the risks and benefits to the participants

Summary

This chapter included a description of the research method for this study. I discussed the research design and rationale, the role of the researcher, the methodology, and issues of trustworthiness and ethical procedures. I provided details about participant

selection, data collection instruments, and the data analysis plan as well as a discussion about issues of trustworthiness and ethical procedures.

In Chapter 4, I present the results of this study, based on implementing this single-embedded case study design.

Chapter 4: Data Collection and Analysis

The purpose of this qualitative case study was to explore how virtual mentoring of novice rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring. To accomplish that purpose, data from interviews, reflective journals, and archived discussion posts were collected from two mentoring pairs in the NTS virtual mentoring program through the Mentoring Institute. The central research question for this study was: How does virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a) five-factor model of mentoring? The related research questions were:

1. How do novice rural teachers describe the virtual mentoring experience?

2. How do mentors of novice rural teachers describe the virtual mentoring experience?

3. How do novice rural teachers and their mentors interact during the mentoring process?

Chapter 4 includes a description of the setting for this case study, which was the NTS program through the Mentoring Institute as well as the participants who met the inclusion criteria. In Chapter 4, I also provide a description of the data collection process, the methods for data analysis, and evidence of trustworthiness for this study. The results and discrepant data are also presented. I conclude Chapter 4 with a summary of the results.

Setting

This case study was conducted at the Mentoring Institute. Data were collected over the 2016-2017 academic school year. As a nonprofit organization dedicated to

providing support and resources for new teachers entering the profession, the Mentoring Institute offers the NTS program as a virtual mentoring program to aid in teacher induction for novice teachers across the United States. Since 2002, the NTS program has supported novice teachers, especially those who work in rural schools, small districts, or hard-to-staff schools. Through the NTS program, novice teachers receive weekly mentoring from a more experienced teacher who shares a similar grade level and/or content area. Mentors receive a small stipend of up to $80 per week to coach the novice teachers in the cohort assigned to them. First-year mentors participate in a three-week asynchronous new mentor training, which orients them to the NTS program and prepares them for online mentoring and communication, as well as building an online community. After the first year, continuing mentors experience a two-week asynchronous training that focuses on reflection upon mentoring practice and provides NTS program updates. During the academic year, mentors receive support through an online mentoring community where they may ask questions, discuss mentoring scenarios with other NTS mentors, receive feedback from Mentoring Institute staff, and access possible content to share with novice teachers in the discussion forums.

Both the mentor and novice teachers interact in a virtual space called Our Place, which is housed in Canvas, a learning management system. One mentor works with a small group of five to seven novice teachers to provide support through online discussions of relevant topics for the duration of one academic year. The Our Place classroom is set up by Mentoring Institute staff, who collect feedback from mentors and mentees each year and consider technological changes to strengthen the virtual learning

space. Mentors have several digital tools available to them in the NTS program: an online discussion board, video chat, video observations, email, private messages, texting, and phone calls. The primary means of mentoring support is enacted through the weekly online discussion forum in Our Place. Mentoring Institute provides a framework to aid NTS mentors in planning the discussion forum. The NTS framework is influenced by research-based topics and phases for supporting novice teachers and offers a guide for mentors, but Mentoring Institute encourages mentors to provide mentoring that is responsive to the unique needs of their novice teachers, which are expressed through previous discussion posts and one-on-one interactions.

In addition to the weekly online discussion forums, novice teachers also receive feedback from their mentor on three different teaching videos captured during their classroom instruction at checkpoints throughout the year. The mentor meets individually with each novice teacher in a pre-conference before the recorded lesson and in a post-conference after the lesson. For this study, I did not have access to the video observations or the online discussions in which the mentors offered feedback, since they were not included in the virtual spaces I observed and access to them was not included in the consent forms which participants signed.

The Mentoring Institute also provides novice teachers with opportunities to grow professionally through engaging in two additional virtual spaces. Through the Our Place portal, novice teachers can access additional online courses called Explorations. Explorations are offered three times a year and address ten to fifteen broad topics related to teaching, which allow the novice teacher to deepen their practice. Novice teachers

select a topic of interest and bring it to life in their own classroom through the support of several mentors outside of their assigned cohort. Through engaging in Explorations, novice teachers enact a teaching concept through three phases of plan/prepare, teach/assess, and analyze/reflect before they complete a self-assessment. For this study, I did not have access to Explorations, since they included mentors outside of the Our Place cohort where I collected data.

Besides Explorations, the NTS program offers novice teachers the ability to access a national community of educators through the Our Place portal, to engage in online discussions related to their specific grade level/content areas. In the national discussion forum, university faculty and Mentoring Institute staff facilitate the discussions, which are drop-in sessions for novice teachers to participate in. In this study, I did not have access to the national discussion forums, since they included mentors outside of the Our Place cohorts where I collected data.

In the NTS program, the majority of mentoring happens in Our Place, where novice teachers have asynchronous access anytime and anywhere to their online community to exchange ideas, find answers to questions, and share teaching resources. Mentors work individually with mentees, as well as in the group discussions, to tailor the mentoring experience to mentees' interests and needs. When mentors and mentees log into the Our Place classroom, they can see the discussion board with the weekly mentoring topics, a place to access shared resources, a program calendar with the NTS mentoring activities (e.g. explorations and video observations), and a link for receiving technical support. Mentors post discussion prompts at the beginning of the week and

encourage their novice teachers to participate in the discussions before the close of the week. However, both mentors and mentees could return to previous discussion posts throughout the year, but this did not happen often during the 2016-17 academic year.

For this study, the NTS program provided the case, and mentoring groups provided the units of analysis. There were two units of analysis in this study. The first unit of analysis was a mentoring group facilitated by mentor Samantha (a pseudonym) with three mentees who were all gifted and talented (GT) teachers from Kansas. In Unit 1, Samantha primarily interacted with her mentees in the NTS learning space called Our Place, as well as by phone and email. Samantha began the mentoring year with a personal phone call to each mentee to introduce herself and to help novice teachers connect a voice to her name. She also sent out a weekly email with a hyperlink to the discussion board, in order to announce the discussion topic posted in Our Place. While Samantha shared her personal cell phone number with her mentees and invited them to call and text at any time, they did not do so. This mentoring unit interacted predominantly in the Our Place virtual mentoring space. Participants in Unit 1 did not meet in person at any time.

The second unit of analysis was a mentoring group facilitated by mentor Elizabeth (a pseudonym) with six mentees who were special education teachers from different states. In Unit 2, Elizabeth also primarily interacted with her mentees inside of Our Place, as well as by phone, email, or Google Hangout. Elizabeth noted, however, that due to different time zones and teaching schedules, it was difficult to set up synchronous times for a phone call or video conference. Like Samantha, this second mentoring unit

interacted primarily in the Our Place virtual mentoring space. Participants in Unit 2 did not meet in person at any time.

Participant Demographics

All participants were considered special education teachers. All of the teachers in Unit 1 were from Kansas. In Kansas, GT education falls under special education, and GT teachers must follow special education laws. All of the teachers in Unit 2 were also special education teachers, but instead of working with GT students, they worked with students having learning disabilities.

Unit 1

While the NTS mentoring group in Unit 1 contained three novice teachers, only one novice was studied as part of Unit 1. Novice teacher Vincent (a pseudonym) received NTS mentoring in his very first year of teaching. In his school district of 655 total students, he taught in three different school buildings, working with GT students at the elementary, middle, and high school levels. Vincent worked in a rural community with approximately 2,800 residents. He was originally certified as an elementary education teacher and was offered a GT facilitator position during his student teaching practicum. He became connected to the NTS program through the director of his special education co-op. While participating in NTS, he was also taking classes to work towards his special education licensure.

Vincent's mentor was Samantha, a teacher with 26 years of experience who had worked in two different school districts. Nineteen years of her teaching career were in the field of GT education, but most recently she had worked in a fourth grade general

education classroom. Samantha has her master's degree in cross-categorical special education with licensure in learning and behavior disorders, as well as gifted education. She had been a mentor for 9 years, and 5 of those had been as a virtual mentor with the Mentoring Institute. In addition to being a classroom teacher, Samantha also held several leadership positions in her district, including working on the leadership team for her school building and participating in the district technology integration team. In 2014, she was a Teacher of the Year nominee for her state.

Unit 2

While the NTS mentoring group in Unit 2 contained six novice teachers, only one novice was studied as part of Unit 2. Novice teacher Denise (a pseudonym) received mentoring through NTS during her second year of teaching. She worked at a small rural high school in Kansas, which served students in grades 7-12. The town where her school was located had a population of less than 1,000. Denise received her bachelor's degree in sociology and went on to get a master's in special education before entering the classroom. As a special education teacher in her district, she worked with grades 7-12 in the resource room helping them with study skills. Her responsibilities included homework support and overseeing student Individual Education Plans (IEPs).

Denise's mentor was Elizabeth, who was working in the eighth year of her teaching career. She worked as a special education teacher at a junior high school in a different state from her novice teacher Denise. Elizabeth was a special education co-teacher, instructing students on her caseload in the regular education classroom alongside the general education teacher. Her responsibilities included seventh grade English

Language Arts (ELA) and eighth grade ELA, math, and science. During this study, Elizabeth was in her first year as a virtual mentor with the Mentoring Institute, but had also previously completed one year as an in-person mentor in her district. Elizabeth received her first teaching license in health enhancement with a minor in history, and had completed a master's degree in special education.

Data Collection

In this qualitative case study, I collected data from multiple sources, including a demographic survey; phone or Skype interviews with mentors and novice teachers; reflective journals written by the mentors and novice teachers; and archived discussion posts from the 2016-17 academic year. On my personal computer, I created an electronic folder entitled "Data" to retain all of my research data in an electronic format. Data files were also backed up on a flash drive and stored in a fireproof safe, as well as backed up in the cloud and protected by a password. For a period of two months between September 25, 2017 and November 26, 2017, I gathered demographic information, conducted interviews, and collected reflective journal responses from the four participants. The demographic survey was distributed as a document attached to email. The reflective journal was also distributed as a document attached to email, and participants returned it to me by email as well. After I had completed interviews and received reflective journals from all four participants, I collected the archived discussion posts from Our Place and transcribed them during one week, starting on November 26, 2017.

Demographic Surveys and Interviews

Due to their policies and procedures, the Mentoring Institute recruited my participants and shared participant names with me after they had signed consent forms. I began recruiting participants through the Mentoring Institute in May 2017. Over five months, the Mentoring Institute sent out five different email invitations to potential participants from their 2016-17 NTS program. After looking for five months to identify participants who met my inclusion criteria for this study, two mentoring pairs had stepped forward. I moved ahead with data collection with those two pairs.

After the Mentoring Institute had introduced me to potential participants, I emailed the demographic survey and reviewed it to ensure that participants matched my inclusion criteria. Then, I invited participants who met my inclusion criteria to set up interviews. I conduct participant interviews over an 8-week period. Three of the four interviews were phone calls, which I audio-recorded on my Macintosh laptop with Audacity software. One interview was conducted via Skype; I also audio-recorded this interview with Audacity software. Once recorded, I placed all of the interview audio-files in the Data folder on my personal computer. Vincent's interview took place over the phone on September 25, 2017 at 12:15 p.m., CST and lasted 27.25 minutes. Samantha's interview took place over Skype on October 2, 2017 at 5:00 p.m., CST and lasted 44.37 minutes. Denise's interview took place over the phone on October 28, 2017 at 2:15 p.m., CST, and lasted 31.30 minutes. Elizabeth's interview took place on October 30, 2017 at 12:10 p.m., MT and lasted 35.08 minutes. The duration of interviews ranged from 27.25

minutes to 44.37 minutes. I reviewed all the audio files and completed the transcriptions of the interviews by typing them in Word documents.

Reflective Journals

After I conducted an interview with a participant, within the same week, I sent them the reflective journal questions and asked them to return their responses to me via email within two weeks. Vincent returned his reflective journal on October 4, 2017; Samantha returned her reflective journal on October 19, 2017; Denise returned her reflective journal on November 13, 2017; and Elizabeth returned her reflective journal on November 26, 2017. For each participant, when I received the reflective journal responses, I copied and pasted the text of the journal into a Word document to create a transcript of it. These reflective journal transcripts were saved in my Data folder on my personal computer.

Archived Discussion Posts

After I conducted all four interviews and received all four reflective journal responses, I went into the NTS program's Our Place to collect the archived discussion posts from the 2016-17 school year. First, I downloaded discussion posts by Elizabeth and Denise on November 26, 2017. The discussion posts in Our Place were organized by weeks and I collected data from 35 different weeks, ranging from August 15, 2016 to May 15, 2017. Due to teaching breaks, not every week of the academic year had a mentor/mentee discussion posted. From the discussion forums, I extracted any posts made by Elizabeth and Denise and downloaded them into a Word document for analysis. I also collected any posts that Denise or Elizabeth made in two additional spaces in the

Our Place classroom. There was an ongoing discussion forum to share resources and an ongoing discussion forum to share work-related successes. I extracted any posts made by Elizabeth and Denise in these two extra discussion spaces and downloaded them into a Word document for analysis. I saved the archived discussion posts in my Data file on my personal computer.

Next, I downloaded discussion posts from Vincent and Samantha on November 30, 2017. I collected data from 33 different weeks, ranging from August 21, 2016 to May 15, 2017. Due to teaching breaks, not every week of the academic year had a mentor/mentee discussion post. From the discussion forums, I extracted any posts made by Vincent and Samantha and downloaded them into a Word document for analysis. As a note, mentor Samantha did not set up any additional discussion forums so data was only collected from the weekly discussions. I saved the archived discussion posts in my Data file on my personal computer. For all of my data collection I had no variations from data collection plan in Chapter 3, nor did I have any unusual circumstances.

Data Analysis

For data analysis, I conducted open coding for each source of data from each mentoring pair to create level 1 codes. Then I moved to axial coding to create level 2 codes for each mentoring pair, working to identify themes in each mentoring unit. Finally, I examined themes across mentoring pairs. The primary tools for my data analysis included Word documents with tables and Excel workbooks.

Level 1 Coding

For each embedded unit in my case, I followed Charmaz's (2011) recommendation for qualitative research and created line-by-line coding for the interview, reflective journal, and archival data. This level 1 open coding followed my a priori codes based upon Hudson's (2004a) five factors in his mentoring model, as well as in vivo codes and descriptive codes, which emerged from the data. I also created memos during level 1 coding to capture my research reflections.

My first step in level 1 data analysis was to convert my transcripts of the interviews, reflective journals, and archived mentoring discussions into tables in Word documents to facilitate coding. I followed the recommendations of Hahn (2008) for how to create tables in Word from transcripts. After each data source had been converted to a table in Word, I read the transcripts line-by-line and placed a priori, in vivo, and descriptive codes, in addition to memos, in the right column of my tables, creating marginal codes and memos that aligned with each unit of the transcript. In vivo codes were placed inside quotation marks to note the participants' original language and memos were created in italics font to differentiate them from codes. I used this coding method for all three data sources from each embedded unit of my case, creating a record for each mentoring pair with level 1 codes. The initial categories of codes included Hudson's five factors of mentoring, as well as in vivo codes from the participant's own words, and descriptive codes that emerged from the data.

I conducted level 1 coding for all of the data related to both mentoring pairs to address my central research question first. My central research question asked, "How

does virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a)

five-factor model of mentoring?" As I created descriptive level 1 codes to answer the

central research question, I added a tag to each of Hudson's five factors to describe the

attribute of the factor. For example, if a participant expressed that they had received

feedback from their mentor related to their classroom management, then I coded that unit

as "feedback classroom management," with "feedback" being one of Hudson's five

factors and "classroom management" being an attribute of Hudson's factor. These

attribute codes helped me to create sub-categories under Hudson's five a priori codes. As

I worked through each data source, I followed Merriam and Tisdell's (2016)

recommendation of the constant comparative method to determine similarities and

differences among the level 1 codes and create the most significant categories of codes

from the interviews, reflective journals, and archived discussion posts. The constant

comparative method helped me to develop a master list of codes that encompassed all of

my data sources. After completing level 1 coding for all data sources, I waited a few

weeks and then returned to look at the data again, to see whether I wanted to revise any

of my level 1 codes or add additional codes that I had not noticed during the first round of

level 1 analysis.

During level 1 analysis, I also conducted a content analysis of the archived

discussion posts for each embedded unit of my case. For each weekly discussion, I used

an archival data form to capture the purpose of the mentoring interaction, the topic and

content of it, and how that interaction was used during the virtual mentoring (see

Appendix D). Summaries of the weekly discussions were recorded on the archival data

form, so no direct quotes from participants were included. This content analysis helped

me to answer my third related research question: "How do novice rural teachers and their

mentors interact during the mentoring process?" After the archived discussions were

summarized on the archival data forms for mentoring pair 1 and mentoring pair 2, I

conducted level 1 coding for each week of discussions. These codes were entered into an

Excel spreadsheet for each mentoring pair.

Discrepant Data

As I analyzed my data and examined level 1 codes, I discovered a body of data

that did not closely align with Hudson's (2004a) five-factor model. In Hudson's original

model, the factor of *system requirements* was related to relevant school policies and

content-specific curriculum with its objectives and requirements—both of which are

influenced by local and national education policies. Part of mentoring, in Hudson's view,

was helping to induct novice teachers into the systems in which they will teach, and his

model emphasized acquainting novices with policy and curriculum. What I discovered,

however, was that my data did relate to helping novices acclimate to their education

systems, but there was more to the virtual mentoring than introducing novices to the

policies and curriculum that formed the requirements of their job. The mentors in this

study were helping novice teachers build *system knowledge,* a factor of mentoring that

was larger than system requirements*,* and included skills such as setting and attaining

professional goals, strategies for communicating with parents and colleagues, or

conducting special meetings. Numerous mentoring discussions in the archived posts

helped to acclimate novice teachers to the education systems of their jobs, but the

discussions did not fit with curriculum and policy—under Hudson's description of

system requirements. The discussions also did not fit under pedagogical knowledge, or

"the interaction of the subject matter and effective teaching strategies to help students

learn the subject matter" (NCATE, 2014, n.p.). Instead, mentors were helping novice

teachers build their knowledge of how to function as a professional in their education

system. As a result, I changed my a priori code of system requirements to system

knowledge when I proceeded to analyze my data with level 2 codes. In the remaining

discussion of my data analysis and the results in Chapter 4, the term system knowledge is

used in place of Hudson's system requirements. This change in terms will also be applied

in Chapter 5.

Level 2 Coding

The first step in my Level 2 data analysis was to transfer my level 1 codes into

spreadsheets in Excel. I followed Hahn's (2008) recommendations for how to create

Excel workbooks that can be used to sort and organize data in order to focus on each

research question. After entering my level 1 codes into Excel workbooks, I examined

each of Hudson's five factors to find themes across the data in order to answer my central

research question.

To begin level 2 analysis, I used the sort functions of Excel to identify all of the

level 1 codes related to personal attributes of the mentor. I studied this master list of level

1 codes related to personal attributes and used pencil and paper to create a concept map

for how these level 1 codes were organized into themes across the interviews, reflective

journals, and archived discussion posts for mentoring pair 1 and mentoring pair 2. In

addition to studying the descriptive codes I created during level 1 coding, I also consulted

Hudson's Five Factors and Associated Indicators (see Figure 2) to see if some of

Hudson's attributes might also apply to my data and provide concepts that would be

useful for my level 2 coding. The themes that emerged from this analysis became my

level 2 codes, which I recorded in a matrix. Table 9 captures the themes in the data

related to personal attributes of the mentor and demonstrates how I collapsed level 1

codes into level 2 codes. The themes that emerged in both mentoring pair 1 and

mentoring pair 2 that related to Hudson's factor of personal attributes of the mentor were

these: (a) knowledgeable, (b) supportive, (c) responsive, (d) positive, and (e) growth

mindset.

Table 9

Hudson's Factor of Personal Attributes of the Mentor

Level 2 Code	Level 1 Codes	
Knowledgeable	Expertise	Confident
	Insightful	Professional
	Leadership	Experienced
	Resourceful	
	Solution-oriented	
Supportive	Affirming	Uplifting
	Approachable	Listening
	Caring	Empathetic
	Encouraging	
Responsive	Facilitating	Open communication
	Available	Helpful
Positive	Enthusiastic	Upbeat
	Gracious	Personable
	Passion	Diligent
	Welcoming	
Growth mindset	Critical reflection on practice	
	Curious	
	Reflective practitioner	

I followed the same process to identify level 2 codes to capture themes for each of Hudson's remaining factors. I studied the master list of level 1 codes, consulted Hudson's Figure 2, and drew concept maps to create themes. Then I recorded the level 1 codes and level 2 codes in matrices to reflect how the level 1 codes collapsed into themes. For Hudson's factor of feedback, these themes emerged: (a) instructional delivery, (b) instructional design, (c) classroom environment, (d) enhances professionalism, and (e) system knowledge. Table 10 captures the matrix that shows the relationship between level 1 codes and level 2 codes.

Table 10

Hudson's Factor of Feedback

Level 2 Code	Level 1 Codes	
Instructional delivery	Instructional delivery "teaching style"	
Instructional design	Individualized instruction Instructional design Lesson planning Curriculum alignment	Refining instruction Improving practice Instruction
Classroom environment	Classroom management Social emotional learning Behavior intervention	Student interactions Student engagement Managing students
Enhances professionalism	Reflection on practice Professional development Feedback parent interactions Feedback rooted in observations Feedback strengthens teaching Videos for self-awareness	Self-awareness Growth mindset Teacher interactions Success Professional growth
System knowledge	Student data Student accommodations Progress monitoring	IEP IEP goals

For Hudson's factor of modeling, these themes emerged: (a) instructional design, (b) student assessment, (c) classroom environment, (d) professionalism, and (e) system

knowledge. Table 11 captures the matrix that shows the relationship between level 1

codes and level 2 codes.

Table 11

Hudson's Factor of Modeling

Level 2 Code	Level 1 Codes	
Instructional design	Classroom instruction	Individualized instruction
	Student-centered instruction	Instructional design
	Student-centered instruction	Instruction
	Application of PK to instruction	
Student assessment	Student assessment	
Classroom environment	PCK student engagement	Classroom management
	Student interactions	Social emotional learning
Professionalism	Caring attitude	Teacher interactions
	Colleague relationships	Student advocacy
	Colleague interactions	Resilience
	Growth mindset	Professional goal setting
	Perspective-taking on challenges	Parent interactions
	Professional interactions	Colleague support
	Professionalism	Teaching philosophy
	Reflection on practice	Task management
	Critical reflection on practice	
System knowledge	Student goals	Writing IEPs
	Gifted service time	Teaching evaluations
	SK curriculum standards	Student IEP goals
	Progress monitoring	Student evaluation
	Student accommodations	Student data collection

For Hudson's factor of pedagogical knowledge, these themes emerged: (a)

instructional design, (b) resources, (c) special education, (d) classroom environment, and

(e) student assessment. Table 12 captures the matrix that shows the relationship between

level 1 codes and level 2 codes.

Table 12

Hudson's Factor of Pedagogical Knowledge

Level 2 Code	Level 1 Codes	
Instructional design	PK individualized instruction	PK technology use
	PK instructional design	PK lesson planning
	PK instructional strategies	
Resources	PK resources	
Special education	PCK	PK student data
	PK	PK student accommodations
	PK behavior intervention	PK student ability
	PK goal setting for students	
Classroom environment	PCK student engagement	PK student interactions
	PK classroom management	PK student engagement
	PK engaging students	PK social emotional learning
Student assessment	PK progress reports	PK student self-assessment
	PK student assessment	

For Hudson's factor of system knowledge, these themes emerged: (a) special education, (b) curriculum, (c) state requirements, and (d) school building. Table 13 captures the matrix that shows the relationship between level 1 codes and level 2 codes.

Table 13

Hudson's Factor of System Knowledge

Level 2 Code	Level 1 Codes	
Special education	SK IEP meetings	SK teacher interactions
	SK Paperwork/IEPs	SK task management
	SK progress monitoring	SK student accommodations
	SK student assessment	SK parent interactions
	SK student data	SK behavior interventions
	SK student evaluation process	SK testing
	SK student goals	SK student testing
	SK student IEP goals	SK student referrals
Curriculum	SK curriculum	SK resources
	SK curriculum interventions	SK standards
	SK resources	
	SK standards	
State requirements	SK locating state stds	SK state stds
	SK special ed state testing	SK professional teaching stds
	SK state requirements gifted ed	
	SK state requirements new teachers	
	SK locating Common Core stds	
School building	SK colleague relationships	SK teacher interactions
	SK classroom funding	SK communication with admin
	SK teacher evaluations	SK colleague interactions

Next, in my level 2 analysis of data, I used the sort functions in Excel to examine the data for my related research questions 1 and 2. Related Research Question 1 asked, "How do novice rural teachers describe the virtual mentoring experience?" I sorted the data to view all level 2 codes connected to novice teacher Vincent's interview and reflective journal. I printed this list of codes for creating a concept map of themes that emerged. Then, I sorted the data in Excel to view all level 2 codes connected to novice teacher Denise's interview and reflective journal. Again, I printed this list of codes and created a concept map of themes that developed. These themes emerged through the novices' descriptions of the virtual mentoring experience: (a) flexibility, (b) responsive mentoring, and (c) access to expertise.

I proceeded with the data analysis by again using the sort functions in Excel to examine the data for my Related Research Question 2, which asked, "How do mentors of novice rural teachers describe the virtual mentoring experience?" I sorted the data to view all level 2 codes connected to the interviews and reflective journals of mentor Samantha and mentor Elizabeth. I printed this list of codes and created a concept map of themes that developed. These themes emerged through the mentors' descriptions of the virtual mentoring experience: (a) flexibility, (b) responsive mentoring, and (c) professional learning community.

For the final stage of level 2 data analysis, I examined the level 1 codes from the content analysis of the archival data forms for mentoring pair 1 and mentoring pair 2. I used the sort functions in Excel to find themes for my Related Research Question 3, which asked, "How do novice rural teachers and their mentors interact during the mentoring process?" These themes emerged from the content analysis of the archived data of the discussion posts: (a) affective support, (b) reflection, (c) resources, (d) modeling, (e) pedagogical knowledge, and (f) system knowledge.

Evidence of Trustworthiness

Providing evidence of trustworthiness for qualitative research is important because the qualitative researcher aims to increase understanding of a particular phenomenon. Readers of a study wish to know if the findings are an authentic representation of reality, because as Merriam and Tisdell (2016) suggested, offering evidence for the rigor of a study increases the usefulness of the findings for influencing "the practice or the theory of a field" (p. 238). In the following sections I describe how I

increased the trustworthiness of this study in relation to the constructs of credibility, transferability, dependability, and confirmability or objectivity.

Credibility

In qualitative research, Merriam and Tisdell (2016) defined credibility as the condition in which the findings of a research study are congruent with reality, based upon the data that is presented (Merriam & Tisdell, 2016). Miles et al. (2014) noted that a credible qualitative study presents an account that "rings true, makes, sense, seems convincing or plausible, and enables a vicarious presence for the reader" (p. 313) through findings that are "clear, coherent…and unified" (p. 313). For this study, here were no changes made to the credibility strategies stated in Chapter 3. I used the strategy of triangulation to improve the credibility of this qualitative research by comparing and contrasting the three sources of data from the interviews, reflective journals, and archived discussion posts that I collected from both embedded units of analysis, or mentoring pairs. I also used the strategy of reflexivity to strengthen credibility by writing memos in a research journal during data collection and analysis about how my biases, dispositions, and assumptions interacted with my research and what I did to address them. As I reflected on the data during analysis, I not only recorded memos in my researcher's journal but also on my transcripts alongside my coding. In addition, I conducted member checks by asking participants to review the tentative findings by e-mailing participants copies of the tentative findings. Participants checked the findings and indicated that the tentative results captured their experiences and perceptions of virtual mentoring through the NTS program. Lastly, I searched for discrepant data as a way of "purposefully

looking for variation in the understanding of the phenomenon" (Merriam & Tisdell, 2016, p. 248).

Transferability

Merriam and Tisdell (2016) defined transferability as "the extent to which the findings of one study can be applied to other situations" (p. 253). To enhance transferability of a study Merriam and Tisdell noted that providing rich, thick descriptions of the setting, participants, and findings of the study will allow readers to draw conclusions of applicability to other situations. Miles et al. (2014) also noted that transferability is enhanced when a qualitative researcher considers how the diversity of the sample might increase applicability and by making transparent any limitations inherent to the sample selection. For this study, there were no changes made to the transferability strategies stated in Chapter 3. I strengthened transferability by using the strategy of providing rich description of the participants, their virtual mentoring space, and the NTS program. I selected novice teachers from different rural schools to increase the likelihood that the results might apply to a variety of mentoring programs in rural schools. Furthermore, I reported the limitations related to my sampling to make transferability transparent to readers.

Dependability

Reliability, or dependability, according to Merriam and Tisdell (2016), is "the extent to which research findings can be replicated" (p. 250). As Merriam and Tisdell noted, dependability in qualitative research is enhanced by consistent methods of using data collection instruments across participants and settings. Dependability is also

strengthened when the results of a study are consistent with the data that was collected. For this study, there were no changes made to the strategies for dependability stated in Chapter 3. I carefully created an audit trail by documenting how the data was collected, analyzed, and interpreted. This audit trail included a researcher's journal with memos, reflections, and decisions I made during the research process, as well as quick time videos of screen capture to discuss my data analysis process. The appendices of this dissertation include additional documentation of my research process with letters of cooperation, consent forms, and data collection instruments. Furthermore, triangulation strengthened dependability for this study and reflexivity captured by memos in the researcher's journal and in the transcripts alongside coding.

Confirmability

In qualitative research, confirmability is the counterpart to objectivity. Miles et al. (2014) suggested several strategies for enhancing confirmability in qualitative research: (a) provide explicit, detailed description of a study's methods and procedures, (b) demonstrate how conclusions align with collected data, and (c) document how the researcher has examined and addressed personal assumptions, values, and biases during the investigation. Merriam and Tisdell (2016) asserted that a qualitative researcher should clarify his or her position during the investigation so that the reader can "better understand how the individual researcher might have arrived at the particular interpretation of the data" (p. 249) and to demonstrate how the researcher's values and expectations "influenced the conduct and conclusions of the study" (p. 249). For this study, there were no changes made to the confirmability strategies stated in Chapter 3. I

strengthened confirmability by using a researcher's journal to reflect on my biases during data collection and analysis. I also prepared a careful audit trail that described data collection and analysis procedures and reported my findings in a manner that made the relationship between collected data and conclusions transparent to the reader.

Results

In relation to the central and related research questions of this study, I analyzed the results. Analysis of the related research questions will be presented first because they build the results for the central research question. As themes are discussed for each research question, salient quotes will be presented to describe the themes. Figure 3 captures the themes in the data for this study.
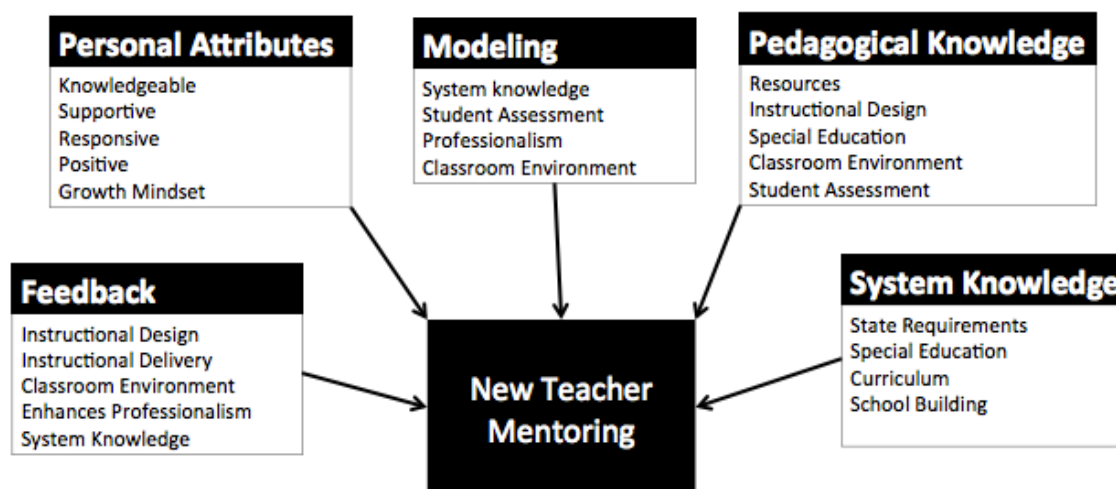

Figure 3. Model of results for central research question. A visual model of Hudson's five factors and their associated indicators as they were represented in this study. Headings of each box represent Hudson's factor and the lists below the headings represent themes in the data.

Related Research Question 1

The Related Research Question 1 (RRQ1) was framed as follows: How do novice rural teachers describe the virtual mentoring experience? To answer this question, I examined the data from the interviews and reflective journals from Vincent and Denise. Three themes emerged to capture their positive perceptions of the virtual mentoring experience: (a) flexibility, (b) responsive mentoring, and (c) access to expertise.

RRQ1 theme 1: Flexibility. Both Vincent and Denise noted the unique nature of virtual mentoring for its flexibility related to time and to mentor matching. Vincent appreciated the asynchronous nature of virtual mentoring so that he could engage with the NTS program when it worked best for his schedule. As he noted: "You can work through the material at your own pace…that was a beauty of it. I didn't have to do it at a certain time." He noted that virtual mentoring provided a type of freedom of flexibility, which allowed him to be focused on his teaching and then to engage in the mentoring discussions at a suitable time. This flexibility of time was not only a benefit to him; Vincent perceived that it also benefited his mentor: "[Samantha] was able to post things when she was available. I was able to post things when I was available, and so I think that's something unique." Denise also noted the unique flexibility of virtual mentoring. She appreciated she could log into the Our Place classroom at any time: "If I was away on the weekend and thought of something or if I was busy all day and couldn't respond until late at night, I could post late at night."

For Vincent and Denise, virtual mentoring provided more than the benefit of flexibility related to time. They also both felt that it allowed them to have flexible mentor

matching. Both novice teachers noted the small sizes of their rural school districts and the limited mentoring resources that they had access to. As a first-year GT teacher, Vincent acknowledged the unique challenges of the specialized job he had, and expressed his appreciation of having a virtual mentor from the same specialization: "You are able to be paired up with a professional in the field that you are teaching in." Vincent noted the benefit of not being limited to finding a mentor who was in geographical proximity to his school. Denise also highlighted the benefit of virtual mentoring to provide flexible mentor matching to help with the challenges of being a novice, rural special education teacher: "My district is so tiny. There are literally three [special education teachers], including me. There's really no one to bounce ideas off, other than grade school teachers who don't quite have the same situations or the same way of dealing with things."

In addition to flexible time and flexible mentor matching, Vincent noted that the NTS program also provided him with flexible feedback on his teaching. As part of the NTS program, Vincent submitted three teaching videos for feedback from Samantha. Unlike having a mentor visit his classroom to observe in-person, Vincent perceived video capture of his teaching was less intrusive. Vincent expressed appreciation for the flexibility of using an iPad to record his instruction because it retained the student focus on learning and retained an authentic learning environment, while still allowing him the opportunity to reflect on his teaching and discuss it with his mentor.

RRQ1 theme 2: Responsive mentoring. Both Vincent and Denise noted the responsive nature of virtual mentoring. Denise described her virtual mentoring experience as a "24/7 support system" and expressed her appreciation for the easily

accessible support she could find. As Denise described it: "the [NTS] system was amazing. I'm not doing that this year and honestly, I miss it…the mentor [was] there for questions when you had a question." She went on to explain more: "The mentors are interested in their mentees. They're basically there day or night. You can leave them an email and you have a response the next day." For Denise, quick responses to questions not only came from her mentor; novice teachers in her cohort also provided timely answers to questions: "You also have others in your group. Some of them are very quick to respond…usually you can get some sort of response, not minute-to-minute, but within a reasonable amount of time." Denise explained that the mentoring support she received was not confined to the discussion forums in Our Place. Her mentor provided personal contact information and they also connected by phone, so Denise could ask questions that she described as needing "a more immediate or private response." Sometimes her mentor would call just to check in and to allow Denise to discuss what had happened in her classroom that day.

Vincent also described virtual mentoring as responsive to his needs as a beginning teacher. Vincent expressed a desire to grow as a teacher. He valued the responsive feedback he received to his ideas on the discussion boards and to his videos capturing instruction. He felt Samantha was "always quick to respond" and "always had good advice for us." Vincent described the virtual mentoring feedback as key for his professional growth:

> Going into [teaching] you think you have all the answers and you think you can [teach], but as you get into the school year and things are popping up…you learn

a lot…by having someone critique you…Sometimes we can be pretty easy on

ourselves and think that we're doing a pretty good job, but sometimes you need

someone to actually say, 'hey, why don't you try this instead of doing that all the

time?'

For Vincent, the weekly interaction in the virtual space provided him with the

opportunity to find answers to questions and receive help with specific challenges he was

facing so he could develop professionally. As Samantha engaged her novice teachers

with questions in the discussion forum, Vincent said, "these questions made me think

about the way I approached certain subjects or situations and helped me realize that there

are often better ways of doing things."

RRQ1 theme 3: Access to expertise. Vincent and Denise spoke very positively

of the many opportunities they had to receive support from a more experienced and more

knowledgeable mentor. Both of them noted the unique system knowledge that their jobs

in special education and GT required and expressed appreciation for the help of their

mentors in areas such as the IEP process, parent interactions, communicating with

administration, and understanding state standards. Vincent admitted, "I had never written

IEPs before…and I had a lot of questions…very specific to my job…Having a mentor

that has done a job very similar to you was very helpful." Denise also was glad that her

mentor created online discussion topics that were relevant to special education.

For Vincent, the access to instructional resources was a significant benefit of

virtual mentoring. In the interview, when he was asked about the types of virtual

mentoring support that had been most beneficial, his first response was, "several

resources that I discovered," noting that many of them he had not previously been aware of. Denise also noted the benefit of sharing resources and appreciated the professional articles and book recommendations for improving her practice. She described one experience of reading an article about a method for teaching math and then trying it in her classroom. Afterwards, she shared with her mentor how it had worked in the classroom and received suggestions for how to improve her instruction the next time.

Both Denise and Vincent acknowledged the advantage of virtual mentoring in a cohort of several novice teachers who work with a mentor. Not only were Denise and Vincent receiving support from their more experienced mentors, but they also had access to the expertise of their peers. Vincent found peer interactions in the online discussion forum to be very helpful: "Sometimes I wasn't exactly sure what questions to even ask." By reading the discussion forums he realized he had similar struggles as other novice teachers, and noted, "I was able to answer [my] questions without even asking them." Denise also appreciated that other mentees in the cohort would respond to her questions.

For Denise, the access to a network of teachers was a significant benefit of virtual mentoring. As described previously in the discussion of flexible mentor matching, she expressed the limitations of finding professional support inside of her own rural school district. For Denise, NTS provided not only an assigned mentor and cohort for weekly discussions, but also important connections to a national community of teachers. She explained that she frequented a national online discussion forum related to challenging student behaviors and presented scenarios from her own classroom to get feedback from other teachers who had similar cases. When Denise was asked what she missed about no

longer participating in virtual mentoring, she said, "having other teachers with more experience." She relied on the NTS program to help her brainstorm new ideas to solve the problems she encountered as a special education teacher.

Related Research Question 2

My Related Research Question 2 (RRQ2) was framed this way: How do mentors of novice rural teachers describe the virtual mentoring experience? To answer this question, I examined the data from the interviews and reflective journals from mentors Samantha and Elizabeth. Three themes emerged to capture their positive perceptions of the virtual mentoring experience: (a) flexibility, (b) responsive mentoring, and (c) professional learning community.

RRQ2 theme 1: Flexibility. Just like their novice teachers Vincent and Denise, mentors Samantha and Elizabeth appreciated how virtual mentoring created flexibility for novice teachers to participate in mentoring on their own time, at their own pace. Both mentors emphasized the benefit of virtual mentoring to provide choices for how novice teachers engaged in mentoring activities. Elizabeth described the advantage of asking a mentor a question "when it comes to mind," rather than waiting for a scheduled, in-person mentoring session. As she explained, "[Mentees] are able to ask questions when they want to and not necessarily have to answer them when they're sitting next to me." Samantha felt that virtual mentoring was not only convenient for novice teachers, but also provided flexibility for her time as well: "it fits into my schedule nicely…it's on my time so it's not just a great thing for a mentee."

Flexible timing was more than convenience. According to Samantha, flexible timing was critical for helping novice teachers reflect on practice. She described the NTS program as "24/7 virtual mentoring" which allowed a novice teacher to log into the system "when they have time to really reflect and respond and think deeply about something." Samantha went on to explain that she perceived the virtual mentoring space fostered deeper reflection than in-person mentoring. As a mentor to novice teachers in her school building, Samantha felt her in-person conversations did not reach the same level of depth as her virtual mentoring discussions. She noted that her virtual mentees could find "time to reflect when they're ready for that." Samantha likened the power of choice that her novice teachers had in the NTS program to her own professional learning in virtual spaces, such as on Facebook and Twitter: "Our professional learning networks now as teachers…can be so powerful when we are in charge of our own learning. On *our* time. When we have time. And when we're ready."

Virtual mentoring also provided flexible mentoring matches, especially for rural teachers. Elizabeth noted the isolation of rural, novice special education teachers: "Special education…is so hard in a rural school. You have one special education teacher, so, who are you going to ask some of [your] questions?" Elizabeth described a novice rural teacher in her cohort who was responsible for special education services in 2 different school districts and had limited access to support. As a virtual mentor, Elizabeth was able to answer the novice's questions and provide support that was missing in her school building and school district.

RRQ2 theme 2: Responsive mentoring. Samantha and Elizabeth both felt it was important to be available to their novice teachers to offer support and help, and they provided multiple digital means for their novices to stay connected through email, phone calls, text, and the online discussion forum. As a virtual mentor, Elizabeth often told her novices "send me questions." Samantha expressed, "I tell [my mentees] I'm available any time. They can call any time. They can text any time. They can email any time." She perceived that novice teachers in a virtual space "might feel like a virtual mentor might be a little more available" to help with concerns, in contrast to an in-person mentor who meets on a pre-arranged schedule or can only offer support during school hours.

Another way that the mentors responded to novice teacher needs was to watch the discussions evolve in the online forum and to tailor future discussion prompts in response to previous ones. Samantha had a clear goal: "I try to make posts as relevant as possible based upon their responses in a prior post." However, Samantha thought that selecting discussion topics was a delicate balance between covering necessary topics and allowing discussion prompts to emerge based on novices' needs. It was important to Samantha to "make sure that my posts are meeting their specific needs for where they're at and where they may be struggling a little." Samantha realized that understanding her novices' needs would help her to respond in a supportive manner:

> Just as student needs vary, mentee needs vary as well. Sometimes mentees need a bit of space, sometimes they need a spark of inspiration, and sometimes they need an experienced teacher to tell them that their current frustrations are common for all teachers in their field.

Both Samantha and Elizabeth felt it was important to share feedback with their novice teachers that would foster professional growth. As Elizabeth noted, "I want to be supportive to [my mentees] but realistic," making sure to give corrective feedback in response to misconceptions when it was necessary. Elizabeth also believed it was important for her to respond to questions "with guidance but not necessarily solutions…I think that they really need to identify their own struggles…and allow them to solve the problem for themselves." Similarly, Samantha expressed the importance of helping her novice teachers grow. She discussed responding to their teaching videos as a means of offering feedback to help them improve their practice.

RRQ2 theme 3: Professional learning community. Throughout the mentor interviews and reflective journals, both Samantha and Elizabeth often mentioned the connection between virtual mentoring and building a supportive PLC. Samantha talked about her goals of building a community inside of the virtual space. She felt that mentorship inside Our Place was richer and deeper because of the cohort of novice teachers working together: "it's more of creating a community rather than just me always offering advice." Samantha acknowledged that GT education is a very specialized field and having a mentoring group for novice GT teachers was a way to help reduce the isolation that GT teachers might feel:

> You kind of tend to feel lonely if you're the only gifted facilitator. [It's helpful] to
> have other like-minded educators who are passionate about such a specialized
> field and kids whose needs are often misunderstood…With virtual
> mentoring…we have a community where we are talking about…how can we best

advocate for the needs of these kids…so you have your tribe, your like-minded educators, and there's just a lot of power to that.

Elizabeth also described the advantage of collaboration inside a community of learners. Like Samantha who mentioned the affective support of being mentored in a group, Elizabeth also noted the affective support that comes from interacting online with peers in a PLC: "[Mentees] are able to see that other people are having the same struggles they are having" and that their experiences are normal. Elizabeth felt that an in-person, one-on-one mentoring relationship would not allow for the same awareness of common teaching challenges in the beginning years. Samantha concurred: participating in the discussion boards allowed novices to understand that the issues they were having were "common in the field" and not because the novice teacher was "doing something wrong."

In addition to providing affective support and reducing isolation, virtual mentoring can enhance reflection on teaching practice in the PLC. For Samantha, the virtual mentoring in Our Place was different from in-person mentoring because "there's a level of depth that you can get to in an online mentoring program that you don't in-person." She noted that some novice teachers feel more comfortable behind digital screens, engaging in reflection or even expressing frustrations, than they do having conversations in person. As she described:

Sometimes you might have a deep thought and maybe it's a little hard to articulate that in person, but if you're typing it, then you know you can go back and can edit it, and adjust, and you can say just what you want to say, behind a screen, rather than in person…I think that may be a unique advantage of virtual mentoring.

In their PLC, both the mentors and the novice teachers had the opportunity to grow professionally. Samantha and Elizabeth acknowledged that their novice teachers brought resources and ideas to the group, which not only benefited their novice peers, but also the mentors. Samantha expressed: "I feel like I have grown as an educator and I have learned many new resources and strategies just from the discussions that we've had…I have learned much more from my virtual mentees than my in-person mentees." Elizabeth also noted that virtual mentoring with NTS was helping her to develop professionally: "it's improving my practice as a special ed teacher." Virtual mentoring creates a PLC that can strengthen both mentors and novice teachers.

Related Research Question 3

My Related Research Question 3 was framed this way: How do novice rural teachers and their mentors interact during the mentoring process? To answer this question, I examined the content analysis from the archived discussion posts from both mentoring pairs. The content analysis form consisted of summaries of each week's discussions and did not contain direct quotes from participants. From the summaries, six themes emerged to capture how the novice rural teachers and their mentors interacted: (a) affective support, (b) reflection, (c) resources, (d) modeling, (e) pedagogical knowledge, and (f) system knowledge.

Throughout the discussion posts from mentoring pair 1 and mentoring pair 2, offering affective support was an important dimension of the mentoring interactions. The mentors began the academic year by building the mentoring community through inviting their novice teachers to share about themselves and about their needs and goals for

professional growth. Throughout the discussion posts, both Samantha and Elizabeth responded to their novice teachers with affirmation and support when the novices described their challenges and asked questions. As a result, the novice teachers felt free to ask questions, to admit when they lacked knowledge, to share about their struggles, and to request support. Novices also felt free to share about their teaching experiences in response to the discussion prompts, and shared strategies from their own practice with the other novice teachers in their cohort.

Another important activity in the virtual mentoring discussions was reflection. Samantha often crafted her questions in a manner that invited novice teachers to reflect on their teaching practice. Elizabeth's novice teachers also reflected on their teaching practice, but a more significant dimension of their interactions was related to sharing strategies. Besides reflecting on their teaching, both mentoring pairs also engaged in reflection on meeting professional goals. Novice teachers set professional goals at the beginning of the year, and the mentors checked in with them throughout the year to help them reflect on their progress towards their goals. This goal setting and progress monitoring of goals was part of the prescribed NTS program.

Furthermore, numerous mentoring interactions in the virtual space involved discussion of and sharing of resources. Mentor Elizabeth even had a separate place in the virtual mentoring space for the group to curate and discuss resources. Samantha's group, however, had more discussion posts in the forum related to exploring new teaching resources, discussing how to implement them, and then reporting back to the group about how they worked in the classroom.

The remaining themes in the interactions in the discussion boards—modeling, pedagogical knowledge, and system knowledge—were related to Hudson's five-factor mentoring model. Modeling was an important activity in both mentoring groups. Throughout the discussions, Elizabeth and Samantha modeled their pedagogy and their skills related to system knowledge. Elizabeth modeled tasks related to managing special education students and paperwork, as well as student interactions, colleague interactions, and parent interactions. In addition, she modeled taking perspective on challenges and a growth mindset. Samantha also modeled tasks related to managing special education students, and interacting with parents, colleagues, and students, as well as a growth mindset. In addition, she modeled instructional design for her novice teachers. Alongside modeling, the mentors also shared pedagogical knowledge with their novice teachers. Samantha's group discussed questioning techniques, high order thinking, and technology integration; how to engage students; and how to create a positive classroom environment. Elizabeth's group also focused on creating a positive classroom environment, discussed technology integration, and looked at differentiated instruction.

The largest number of discussion topics in both groups related to building system knowledge. Special education is a field with specialized tasks. Activities like writing IEPs, discussing student progress with parents, collaborating with general education teachers, designing appropriate learning environments, and managing paperwork are technical activities requiring specialized knowledge. In Elizabeth's group, 17 out of 36 discussions were focused on topics related to building system knowledge; in Samantha's group, 9 of 33 discussions related to system knowledge.

Central Research Question

My Central Research Question was framed this way: How does virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a) five-factor model of mentoring? To answer this question, I analyzed the data from interviews, reflective journals, and archived discussion posts from both mentoring pairs. Using Hudson's (2004a) model, I looked for the five factors of mentoring in each embedded unit of analysis and then compared results across units, refining level 1 codes into larger themes as level 2 codes.

Personal attributes of the mentor. As a mentor, one of the most consistent characteristics of Samantha was her display of being supportive and responsive to her novice teachers. In her interview, Samantha noted her goal of creating a mentoring community to help reduce feelings of isolation and connect novice teachers. Her reflective journal noted these same qualities: "As a virtual mentor I am encouraging, positive, and resourceful. The tone of my communications is always upbeat and supportive, and I make myself highly accessible to my mentees by whatever means works best for them." Her mentee Vincent concurred: "Even though we were new teachers (and probably screwed up a lot) [Samantha] was very thoughtful in her comments and responses." This positive tone when offering support came through often in the discussion posts. For example, when Samantha responded to one of Vincent's post, she remarked:

> What a powerful thing to hear, that gifted [education] is the only reason a kid comes to school. On one hand, that is confirmation that you are making a HUGE

difference in that child's life, on the other hand, it means that there is a classroom

teacher who needs your help to provide support/inspiration for ways in which that

student can be challenged…I wonder if that child's teacher would be open to

some ideas from you for enrichment?

This sample of a discussion post from Samantha captures her encouraging and

enthusiastic tone and demonstrates her skill of drawing novice teachers into further

reflection. Other attributes that Samantha demonstrated as a mentor were being

knowledgeable and having a growth mindset. With nearly 20 years of experience in GT

education, Samantha shared her expertise easily and discussed her own reflection on

teaching practice as she presented topics for her cohort to discuss in the forums.

Like Samantha, Elizabeth also consistently displayed being supportive and

responsive to her novice teachers. In her reflective journal, Elizabeth described herself as

supportive and personable: "I am there when [my mentees] need support…I get to know

my mentees and understand how to support them." Elizabeth was especially focused on

making sure that novice special education teachers had the support to successfully

navigate the technical aspects of their jobs. For example in one of the discussions she

responded to a novice this way: "The IEP process can take a long time at first. I would

love to walk through one with you. Is it the PLAAP statements? I know that is what

takes me the longest. I also know when I became more familiar with the standards I was

able to choose what were the key elements." Her willingness to be open about her

teaching experiences, to respond in empathy to novice teachers, and to be available to

help all contributed to the attributes of being supportive and responsive. Elizabeth's

mentee Denise concurred, and described Elizabeth as caring, uplifting, and encouraging. In addition, Elizabeth demonstrated characteristics of being knowledgeable, positive in her outlook, and having a growth mindset.

Feedback and modeling. Of all of Hudson's (2004a) five factors, feedback showed up the least in the data. The NTS program did require that novice teachers submit three videos to capture their classroom instruction for their mentors to view and offer feedback. However, I did not have access to the videos or the mentoring discussions related to the videos, since they were not in the virtual spaces that I observed, nor were they included in the consent forms that participants signed. Vincent spoke favorably of the experience of receiving feedback on his instruction, noting that seeing videos of himself teaching and receiving his mentor's feedback was one of the most beneficial aspects of his virtual mentoring experience. Aside from the video observations, Hudson's factor of feedback emerged in the interactions on the discussion boards. As the novice teachers responded to the discussion prompts, the mentors would offer feedback on their strategies and conceptions about teaching. Elizabeth was especially engaged in giving feedback to her novice teachers. Focusing many of her discussions on the technical aspects of being a special education teacher—such as writing IEPs—Elizabeth carefully gave feedback to her novice teachers to ensure that they were following the professional guidelines of special education. Both Samantha and Elizabeth offered feedback in these domains: the classroom environment, instructional design, and system knowledge. Elizabeth also offered feedback related to student assessment. In addition, both mentors

offered feedback on their novices' professional goals and progress towards meeting their goals.

Feedback was often paired with modeling educational practices in the discussion boards. A novice teacher might reply to a post, and the mentor would give feedback about their idea and then model how she had addressed the issue in her own classroom. Elizabeth was especially attuned to using the technique of modeling during her mentoring interactions in the online discussions, and demonstrated more instance of modeling in her mentoring than Samantha. For example, "Paperwork does seem to get the best of us. I like to use Google Forms to monitor behavior kids. It actually calculates it all and makes it into nice graphs! I can do a tutorial if anybody would like." Then in the resources area of the virtual mentoring space, Elizabeth shared a video that captured her computer screen and modeled how to set up a Google Form to track student behavior and generate reports from that form. Elizabeth narrated the video, talking her novice teachers through the process of using Google Forms for tracking and compiling data for special education students.

Samantha and Elizabeth had some similarities and differences in the types of things they modeled. They both modeled how to create an effective classroom environment and some of the technical aspects of teaching special education. They also both modeled professional behaviors to help novice teachers interact with parents, students, and colleagues—and to help them develop a growth mindset. That growth mindset was demonstrated through modeling reflection on teaching practice, perspective-taking on challenges, and how to pursue professional goals. However, Samantha spent

more time modeling instructional design than Elizabeth, who spent more time modeling dimensions of system knowledge, as well as student assessment.

Pedagogical knowledge. NCATE (2014) defined pedagogical knowledge as "the interaction of the subject matter and effective teaching strategies to help students learn the subject matter" (n.p.). Mentoring in pedagogical knowledge emerged differently in the mentoring pairs. Samantha's group was comprised of GT teachers who were supporting their students by offering an enriched curriculum. A significant part of the mentoring in pedagogical knowledge was sharing and discussing resources. Vincent remarked that one of the most valuable aspects of participating in the NTS program was getting access to new resources he had not previously known about. Samantha also remarked about the professional benefit to herself by receiving access to new resources from her novice teachers. Second to sharing resources were discussions about instructional design, followed by discussions about creating an effective classroom environment. Lastly, Samantha's group discussed some of the more technical aspects of teaching GT students.

Elizabeth's group spent much less time with mentoring in instructional design than they did focusing on creating an effective classroom environment. Like Samantha's group they also shared numerous resources, but discussions about student assessment had a bigger focus than in Samantha's group. Lastly, they examined some of the more technical aspects of instructing students with learning disabilities.

System knowledge. For both groups, Samantha and Elizabeth spent a significant amount of their mentoring activities helping their novice teachers develop system

knowledge about special education. Topics they covered included IEP goals, IEP meetings, progress monitoring, student assessment, student data collection, student referrals, behavior interventions, and student accommodations, to name some of them. Both mentors also coached their novice teachers in how to have successful relationships with their colleagues in their buildings. An interesting finding was that while Hudson (2004a) emphasized curriculum and state policy as important aspects of system knowledge, those factors did not have a strong representation in the data. As noted in the discussion of the results under RRQ3, the largest number of online discussion topics in both groups related to building system knowledge.

Discrepant Data

There were a few areas of discrepant data in this study. Vincent and Denise appreciated how virtual mentoring created flexible time for engaging in mentoring activities. Samantha also noted that benefit. Elizabeth shared that it was a benefit to her novices that the virtual space was open 24/7. However, Elizabeth did make a note that one aspect of virtual mentoring was more challenging than in-person mentoring. Virtual mentoring did not provide flexibility when she had to arrange synchronous contact with novice teachers. Some of the novices in her cohort were from different time zones from herself. With busy teaching schedules and working hours that did not align easily, it was difficult for Elizabeth to coordinate time to communicate with her novice teachers synchronously.

Another dimension of discrepant data in this study related to Samantha's discussion of creating a connected community. On one hand she discussed the benefit of

virtual mentoring to connect GT educators across geographical boundaries to create what she called a "tribe of like-minded educators," who have common goals in a specialized field of education. On the other hand, she discussed the challenge of helping the members of her cohort connect with her. As she described, "it's a challenge to build those relationships virtually, and it's a challenge to create a community…where… mentees really…feel like you are a very valuable support person in their lives."

Furthermore, discrepant data showed up in the dimension of sharing resources virtually. Samantha perceived that sharing and discussing resources was an integral part of the virtual mentoring in her group. She felt that one of the most beneficial things she could do as a mentor of GT teachers was to share resources. Elizabeth, on the other hand, perceived that sharing resources was more difficult virtually and was easier during in-person mentoring. However, analysis of the data in Elizabeth's discussion group demonstrated that there were numerous examples of the mentor and novice teachers sharing resources.

Finally, discrepant data emerged in the area of system knowledge. Content analysis of the archived discussion posts in Elizabeth's group revealed that 17 out of 36 discussions were focused on topics related to building system knowledge. Yet, Elizabeth felt that virtual mentoring still had some noticeable drawbacks in helping her novice teachers develop system knowledge. Unlike Samantha, Elizabeth had novice teachers from different states. While federal laws for special education are the same across states, how they are implemented looks different. Elizabeth shared the examples of different formats for IEP documents, different state assessment programs, or different student

databases. Elizabeth could help her novice teachers develop their system knowledge to a point, but then there were still technical aspects, which she could not assist them with in detail. Elizabeth described having to take time to research about special education in the states where her novice teachers taught, in order to answer some of the questions they posted in the discussion forum. She even contacted educators in different states to track down answers. In her own state, Elizabeth felt comfortable contacting other professionals because she understood the special education network. She did not have similar knowledge of the education systems in other states. Elizabeth noted that this sometimes made offering adequate mentoring support difficult.

Summary

Chapter 4 described the setting for this case study and the demographic information for the participants. Strategies used to improve the trustworthiness of this research were also presented. In addition, Chapter 4 described the data collection, data analysis, and results for this qualitative study in connection to the central research question and the related research questions. Through single-unit and cross-unit analysis, several themes emerged. In regards to Related Research Question 1, novice teachers perceived virtual mentoring as providing flexibility, responsive mentoring, and access to expertise. In connection to Related Research Question 2, mentors perceived virtual mentoring as providing flexibility, responsive mentoring, and a professional learning community. In connection to Related Research Question 3, mentoring interactions in the virtual space included affective support, reflection, and sharing resources, in addition to Hudson's factors—system knowledge, pedagogical knowledge, feedback and modeling.

Key findings related to the central research question indicated that all of Hudson's () five factors were present in the data. Mentoring interactions containing feedback had the least representation. However, feedback was present as it related to effective classroom environments, instructional design, system knowledge, and student assessment. Mentors also offered feedback on professional goals, and feedback helped to enhance the professionalism of the novice teachers, particularly through feedback on video observations of teaching. Modeling was often paired with feedback in the mentoring exchanges. Mentors modeled effective classroom environments, instructional design, tasks related to special education, and student assessment. In addition, mentors modeled a growth mindset as professionals. Furthermore, pedagogical knowledge and system knowledge were discussed often in mentoring interactions. In the domain of pedagogical knowledge, mentoring discussed resources, instructional design, the classroom environment, special education teaching strategies, and student assessment. A large part of discussion about system knowledge in mentoring exchanges was related to special education tasks. In addition, system knowledge included interactions with colleagues within a school building, interaction with parents, curriculum, and state requirements. Finally, the personal attributes of the mentors effected the virtual mentoring in this study. Mentors were supportive, responsive, positive, and knowledgeable, while demonstrating a growth mindset.

In Chapter 5, I will interpret the results of this study in relation to the research questions and the literature review in Chapter 2, as well as the conceptual framework for this study, which was Hudson's (2004a) five factors of mentoring. Chapter 5 will also

include a discussion of the limitations of this study and recommendations for future

research. I will conclude Chapter 5 with implications for social change.

Chapter 5: Interpretation and Significance

The purpose of this qualitative case study was to explore how virtual mentoring of novice rural teachers through DCTs reflected Hudson's (2004a) five-factor model of mentoring. I used a single case study design with two embedded units of analysis to conduct this research. A case study design was appropriate because case studies are tools for empirical inquiry when the researcher explores in depth a phenomenon in a real-life context, by collecting data from multiple sources to explore multiple variables (Yin 2014). In this research, I explored the phenomenon of effective mentoring of novice, rural teachers in the context of virtual interactions. To gain a deeper understanding of the phenomenon of virtual mentoring, I gathered data from two mentoring pairs, by collecting interviews, reflective journals, and archived virtual mentoring discussion posts. This study was conducted in relation to a gap in research, which indicated that there is a lack of research on virtual mentoring to support novice teachers in rural K-12 public schools. Although a significant body of research has examined in-person new teacher mentoring, very little research has addressed mentoring novice rural teachers. Even less has examined virtual mentoring as a means of supporting novice rural teachers with an external mentor. A gap existed in the literature as to whether or not virtual mentoring could achieve some of the same positive outcomes as in-person mentoring. Therefore, in this study, I addressed these gaps in research by exploring how Hudson's factors of in-person mentoring emerged in virtual mentoring.

Through single-unit and cross-unit analysis, several themes emerged. With respect to Related Research Question 1, novice teachers perceived virtual mentoring as

providing (a) flexibility, (b) responsive mentoring, and (c) access to expertise. With

respect to Related Research Question 2, mentors perceived virtual mentoring as providing

(a) flexibility, (b) responsive mentoring, and (c) a professional learning community. With

respect to Related Research Question 3, mentoring interactions in the virtual space

included (a) affective support, (b) reflection, and (c) sharing resources, in addition to (d)

Hudson's (2004a) factors—system knowledge, pedagogical knowledge, feedback,

modeling, and the mentors' personal attributes.

Key findings related to the central research question indicated that all of Hudson's

(2004a) five factors were present in the data. Mentoring interactions containing feedback

had the least representation. However, feedback was present as it related to effective

classroom environments, instructional design, system knowledge, and student

assessment. Mentors also offered feedback on professional goals, and feedback helped to

enhance the professionalism of the novice teachers, particularly through feedback on

video observations of teaching. Modeling was often paired with feedback in the

mentoring exchanges. Mentors modeled effective classroom environments, instructional

design, tasks related to special education, and student assessment. In addition, mentors

modeled a growth mindset as professionals. Furthermore, pedagogical knowledge and

system knowledge were discussed often in mentoring interactions. In the domain of

pedagogical knowledge, mentors and novice teachers discussed resources, instructional

design, the classroom environment, special education teaching strategies, and student

assessment. A large part of the discussions about system knowledge in mentoring

exchanges was related to special education tasks. In addition, system knowledge included

interactions with colleagues within a school building, interaction with parents, curriculum, and state requirements. Finally, the personal attributes of the mentors affected the virtual mentoring in this study. Mentors were supportive, responsive, positive, and knowledgeable, while demonstrating a growth mindset.

<div align="center">Interpretation of Findings</div>

To complete the literature review for this study, I examined approximately 600 scholarly articles about new teacher mentoring. The majority of that body of research examined in-person mentoring interactions. The findings of this study demonstrated that many of the same qualities of in-person mentoring were also present in the virtual mentoring exchanges in the NTS program. In this section, I will first present interpretation of the findings for each related research question, followed by the central research question.

Novice Teacher and Mentor Perceptions of Virtual Mentoring

Related Research Question 1 and Related Research Question 2 both explored how participants in virtual mentoring described their experiences. Related Research Question 1 was framed this way: How do novice rural teachers describe the virtual mentoring experience? The major findings connected to this research question were that virtual mentoring provides (a) flexibility, (b) responsive mentoring, and (c) access to expertise. Related Research Question 2 was framed this way: How do mentors of novice rural teachers describe the virtual mentoring experience? The major findings connected to this research question were that virtual mentoring provides (a) flexibility, (b) responsive

mentoring, and (c) a professional learning community. These two research questions will be interpreted together because the themes are parallel.

Flexibility. Previous research supports that flexible mentoring is important for inducting novice teachers into the profession. Bullock and Ferrier-Kerr (2014) noted that using digital tools for mentoring creates flexibility for the mentoring process, by overcoming barriers of time, geography, and culture. Results of my study confirm this finding; both novices and both mentors claimed an important benefit of virtual mentoring was flexible time for engaging in mentoring activities, and mentees Vincent and Denise described virtual mentoring as solving the problem of the geographical barriers of working in small, rural districts. Research on rural schools has indicated that rural teachers often feel professionally distant from training, resources, and colleagues (Burton et al., 2013; Goodpaster et al., 2012), and although they desire more professional development to enhance their teaching, limitations in their rural context hinder the support that they have access to (Broadley, 2012; Berry et al., 2011; Hellsten et al., 2011). My research aligned with these findings and demonstrated that virtual mentoring has the potential to provide innovative flexibility for removing barriers for the professional growth of rural teachers.

In addition to flexible time, results of my study also indicated that virtual mentoring provides flexible mentor matching. The literature establishes the importance of effective mentor matching for supporting novice teachers. In a mixed methods study of 998 novice teachers and 791 mentors, Frels et al. (2013) indicated that novices desired having a mentor from their grade level and content area, and when they were not matched

in that manner, they perceived that mentoring was less effective. Furthermore, when a mentor and a novice teacher are matched both by subject and by grade level, conversations about pedagogical knowledge are facilitated (Nasser-Abu Alhija & Fresko, 2014), and novices have increased help with curriculum-specific challenges (Roff, 2012). In my study, conversations about pedagogy and curriculum-specific challenges emerged in the online discussion forum. Virtual mentoring provided the flexibility for novices Denise and Vincent to be matched with mentors outside of their schools to experience those dimensions of mentoring.

Finally, my research demonstrated that virtual mentoring provides flexibility that fosters reflection on practice. Previous literature shows that virtual mentoring through asynchronous conversations can enhance reflection. Ormond's (2011) case study of eight mentoring pairs who interacted by email indicated that novice teachers appreciated the reflective space outside of the school day that asynchronous, online dialogue provided. Furthermore, their mentors perceived that asynchronous online mentoring conversations provided the benefit of elapsed time to enhance problem solving and create an objective perspective on challenges. In my study, mentor Samantha described a similar flexibility for reflection during the mentoring process. As Samantha noted, asynchronous virtual mentoring conversations allowed novices to reflect on their teaching on their own time, at their own pace, giving them the power to be in charge of their professional learning and providing the opportunity for a richer and deeper reflection on their teaching.

Responsive mentoring. One result of this study was that both mentors and both novice teachers perceived virtual mentoring to be responsive to the needs of novice

teachers. Previous research supports the importance of responsive mentoring (Crutcher & Naseem, 2016), and effective mentors respond to novice teachers' personal and professional needs to create individualized mentoring based upon a holistic understanding of the novice teacher (Gardiner, 2012). According to a Dutch mixed methods study, responsive mentoring had the potential to increase reflection on practice, to enhance construction of pedagogical knowledge, and to encourage novices to monitor their own professional growth (van Ginkel, Oolbekkink et al., 2016). These outcomes of responsive mentoring were also present in my research; reflection, building pedagogical knowledge, and monitoring professional growth were mentoring activities documented in the online discussion forums of this study. In this way, research on in-person mentoring was extended to virtual mentoring.

Two participants in my study described their experiences of virtual mentoring as "24/7 support." Other research indicates that novice teachers appreciate regular interactions with their mentors (Mann & Tang, 2012), and when they have limited contact with their mentors, they might experience feelings of isolation (Bleistein, 2012). However, Bleisten's research also showed that increased contact with mentors, who responded with encouragement and affirmation, fostered pedagogical support and affective support displayed through listening and sharing experiences. Clark and Byrnes (2012) also highlighted the importance of a mentor's response of encouragement and good listening when novice teachers face self-doubt. Data from the online discussions in this study demonstrated examples of these types of affective support as Samantha and Elizabeth responded to their novice teachers; thus, this study again extended research

from in-person mentoring into virtual mentoring. The virtual mentoring space provided a place for novice teachers to receive timely support in response to their needs.

Access to expertise and to a professional learning community. The results of my study indicated that novice teachers appreciated access to expertise through virtual mentoring, and their mentors appreciated the professional learning community that virtual mentoring created. Both of these perceptions relate to professional development through virtual mentoring activities. In my study, both novice teachers spoke positively of the many opportunities they had to receive support from a mentor with more expertise. Vincent expressed that virtual mentoring helped to connect him to expertise, so he could do the specialized job of a GT facilitator in his district. Research indicates that mentors provide expertise in orienting a novice teacher to the specific tasks of their job (Gut et al., 2014; Nasser-Abu Alhija & Fresko, 2014; Mann & Tang, 2012). Denise appreciated the access to expertise in solving teaching challenges. Denise's appreciation of support when facing problems parallels other research: novice teachers are looking for a mentor with more experience who can help them with problems common to their teaching assignment, by offering encouragement and professional knowledge (Alemdag & Erdem, 2017; Paris, 2013; Hobson, et al., 2012). Furthermore, Sharplin et al. (2011) discovered that professional conversations and access to professional development could provide critical support to novice, rural teachers. While previous research related to helping novice teachers receive support from more experienced mentors has been conducted for in-person mentoring relationships, my study demonstrates that similar support can emerge in virtual mentoring.

From the mentors' perceptions in my study, virtual mentoring provided a PLC that benefited both the novice teachers and themselves. My findings indicated that the mentors perceived virtual mentoring in a cohort reduced the isolation of novice teachers in rural schools and in specialized jobs, as well as offered affective support and a sense of normalcy for the challenges they faced. These findings parallel the work of Bell-Robertson (2014) who discovered that virtual wiki communities create peer-mentoring spaces where novice teachers could find emotional support for their daily practice as they exchanged ideas to gain multiple perspectives on teaching challenges. In addition, Taranto (2011), noted the benefit of virtual communities for novice teachers to find strong connectedness and opportunities for self-reflection, alongside access to resources and support for improving instruction.

In my study, the mentor played an important role in facilitating the PLC. Other research underscores the important role of the mentor in creating a space for affective support. When a mentor perceives her role as a collaborator, she builds trust with the novice teacher and facilitates professional learning (Gardiner, 2012). Furthermore, viewing a novice teacher as an equal colleague fosters listening and offering suggestions, rather than giving directives (Ramnarain & Ramaila, 2012). These mentoring behaviors and mindsets were present in the online discussions of this study. Samantha and Elizabeth facilitated the virtual PLC for their novice teachers with an attitude of collaboration that resulted in co-learning, effective listening, and offering suggestions.

Finally, my study demonstrated that virtual mentoring in a cohort could provide innovative professional development for mentors. Both Samantha and Elizabeth

discussed the professional growth that participating as an NTS mentor had provided for them. This finding confirms other research. Experienced teachers see their mentoring as opportunity to reflect on their own practice and adopt fresh approaches (Reese, 2015) such as new creative ideas for instruction (Roff, 2012). In other research, mentors saw their mentoring as critical professional development for becoming more aware of their own teaching, for revising their own pedagogy, and for constructing their knowledge of the profession (da Graca Nicoletti Mizukami, de Medeiros Rodrigues Reali, & Simoes Tancredi, 2015). McAleer and Bangert (2011) discovered that the more mentors participated in online mentoring discussions, the more they reported enhancing their professional knowledge and skills and subsequently changing their own practices. In my study, virtual mentoring created a virtual PLC that provided professional development valued by Samantha and Elizabeth.

Virtual Mentoring Interactions

Related Research Question 3 was framed this way: How do novice rural teachers and their mentors interact during the mentoring process? Key findings for this question were that virtual mentoring interactions included (a) affective support, (b) reflection, (c) sharing resources, and (d) Hudson's (2004a) mentoring factors of pedagogical knowledge, system knowledge, modeling, and feedback. Interpretation of the findings related to Hudson's 5 factors will be discussed in the following section addressing the central research question and conceptual framework.

Affective support. One finding of this study was that virtual mentoring interactions included affective support for novice teachers. The data indicated that the

novice teachers felt free to share about their challenges, to express their professional needs and goals, to ask questions, and to share about their teaching experiences and strategies. The NTS mentors created a virtual space that was welcoming, affirming, and supportive. Previous research highlights the importance of affective support in mentoring relationships with novice teachers. In one study, novice teachers expressed a high value for encouragement and affirmation from their mentors after they confided their teaching weaknesses (Brannan & Bleistein, 2012). In another study, novice teachers were looking for encouragement and commitment in mentoring interactions, and not merely the transmission of professional knowledge (Cowin et al., 2012). Additional research has shown that novice teachers experience self-doubt and appreciate mentors who demonstrate good listening, guidance, celebration of success, and affirmation (Paris, 2013; Clark & Byrnes, 2012). Other novice teachers find it helpful to share about teaching challenges with their mentors and discuss solutions (Eisenschmidt et al., 2013), and they often seek emotional support from more experienced teachers who are not evaluating them (Desmione et al, 2014). The findings of my study extend this previous research related to in-person mentoring by demonstrating the presence of these types of affective support in virtual mentoring of novice teachers.

In my study, Vincent and Denise received affective support from mentors who were not inside of their school buildings. Current research also demonstrates that affective mentoring support can come from external mentors. McIntyre and Hobson (2016) discovered that external mentoring can provide a safe zone for being vulnerable about challenges by creating a "refuge and reflexive" space not available inside of a

school building (p. 147). In their study, novices freely shared about professional learning needs without feeling inhibited or criticized due to the pressures of their school cultures. McIntyre and Hobson's research was related to in-person mentoring, but my study demonstrates that external, virtual mentors can also provide affective support where novice teachers can admit challenges and ask for help. The results of my study align with the research of Alemadg & Erdem (2017), who also discovered that asynchronous virtual mentoring can provide important affective support from external mentors.

Reflection. One finding of my study was that in the virtual space, novice teachers and mentors often engaged in reflection on practice. Effective mentors are reflective practitioners who help their novice teachers critically reflect on practice (Crutcher & Naseem, 2016) by creating a space for inquiry, so that novice teachers can seek clarification, articulate goals, thoughtfully analyze problems, and create future action steps (Gardiner, 2012). In my study, these activities of reflection were present in the virtual mentoring, extending this research on in-person mentoring. Mentoring research demonstrates the importance of reflection. Novice teachers who engaged in more reflection on practice reported a greater perception of support from their mentor (LoCasale-Crouch et al., 2012). In addition, when mentors help novices probe their own practice and teaching philosophies, the novices grow in their pedagogical knowledge (Crutcher & Naseem, 2016).

When mentors receive more cycles of professional development, they are more likely to enact habits of inquiry to help novices construct their knowledge of teaching (Langdon, 2014). In the Our Place discussion forum, Samantha, who had received five

years of mentor training through the Mentoring Institute, included more reflective questions in her discussion posts than Elizabeth who had only worked with the Mentoring Institute for one year. Samantha's and Elizabeth's use of questions in the online mentoring forums parallels research that demonstrates a mentor's ability to use questions helps novice teachers intentionally and systematically examine their practice (Athanases, 2013; McDonald & Flint, 2011).

Sharing Resources. One finding of my study was that virtual mentoring interactions in NTS included the sharing and discussion of teaching resources. Novice teacher Vincent found the access to resources to be especially helpful for strengthening his practice. Other research demonstrated that novice teachers appreciate the pragmatic help of a mentor in curating resources (Nolan et al., 2013). Some research indicated that virtual mentoring can be an effective means of sharing and discussing teaching resources for improving instruction (Taranto, 2011). In an Australian study of first-year teachers in isolated, rural schools, the sharing of quality resources through asynchronous virtual mentoring was perceived as very helpful for strengthening classroom instruction (Cooper et al., 2014). The findings of my study align with this research on the benefit of virtual mentoring for providing novice, rural teachers with access to teaching resources.

Conceptual Framework: Hudson's Factors of Mentoring in Virtual Mentoring

The central research question of my study was framed this way: How does virtual mentoring of novice rural teachers through DCTs reflect Hudson's (2004a) five-factor model of mentoring? Embedded in the central research question was the conceptual framework for this study, which was Hudson's five-factor model of mentoring. Hudson's

mentoring model identifies five characteristics that foster an effective mentoring relationship to enhance the professional growth of novice teachers. These factors include (a) feedback, (b) pedagogical knowledge, (c) modeling, (d) system requirements, or system knowledge, and (e) the personal attributes of the mentor (Hudson, 2004a; Hudson et al., 2005). The key findings of my study were that all five of Hudson's factors were present in the virtual mentoring. Feedback had the least representation in the data. Mentoring in pedagogical knowledge had the greatest representation, followed by modeling effective teaching behaviors. Mentoring in system knowledge was also present. Finally, the personal attributes of the mentor had an important impact on the virtual mentoring interactions.

Feedback. The NTS program required novice teachers to submit three videos to capture their classroom instruction for their mentors to view and offer feedback. While I did not have access to those videos or subsequent feedback conversations, novice teacher Vincent did discuss their value in his interview. Vincent's perceptions are substantiated by other research. Novice teachers value feedback on lesson plans and teaching observations (Burke et al., 2015), and a lack of teaching observations and infrequent feedback has been identified as a source of frustration for novice teachers (Kahrs & Wells, 2012). Similar to Vincent, the novice teachers in another virtual mentoring study perceived video capture of their teaching was important for helping them reflect on and improve their practice (Gronn et al., 2013). In a different virtual mentoring study, novice teachers valued the dialogic inquiry of their mentors' virtual feedback they received after the video observation (Reese, 2013).

Aside from the video observations, Hudson's factor of feedback primarily emerged in the online discussions as mentors offered feedback on their novice teachers' conceptions of teaching. Current research of in-person mentoring has identified that feedback positively impacts professional growth when it is timely and frequent, it engages the teacher in correcting misperceptions, it provides specific and accurate details, and it focuses on the task and/or goal (Thurlings et al., 2013). In my study, these elements of feedback were present in virtual mentoring interactions. Furthermore, the strategic use of questions during mentor activities provides important feedback to foster reflection among new teachers (Athanases, 2013; Olsher & Kantor, 2012; Thurlings et al., 2012). The strategy of asking questions to provide feedback and the opportunity for deeper reflection was present in the archived discussions of this study as well.

Pedagogical knowledge. In my study, both mentoring pairs engaged in discussions about pedagogical knowledge, which included conversations about teaching resources, instructional design, the classroom environment, student assessment, and strategies for teaching special education students. To enhance these conversations about pedagogy, the Mentoring Institute matches mentors and novice teachers by subject and grade level, a practice supported by research (McIntyre & Hobson, 2016; Nasser-Abu Alhija & Fresko, 2014). Research demonstrates that novice teachers appreciate mentoring activities that increase practical knowledge for improving instruction (Nolan et al., 2013) and value exchanging ideas on instruction and classroom management and sharing resources (Brannan & Bleistein, 2012). The findings of this previous in-person mentoring research parallel Vincent's perceptions of the value of his virtual mentoring.

In my study, both mentors took time to get to know their novice teachers and understand their professional needs, which Achinstein and Fogo (2015) indicated was important for developing pedagogical knowledge. When a mentor understands the pedagogical knowledge and skills of her novice teachers, she is able to help the novices strengthen their pedagogy (Crutcher & Naseem, 2016). In another study on new teacher mentoring, mentors identified several important conditions for effective mentoring in pedagogical knowledge: (a) mentoring strategies to communicate effectively and respond to novices' individual needs, (b) a mentor with broad and deep content knowledge to help novices deliver instruction, (c) knowledge to support novices in addressing the specific needs of diverse learners, and (d) knowledge of formative assessment (Achinstein & Davis, 2014). My study extended these conditions from in-person mentoring to virtual mentoring; the data of my study supports the presence of each of these conditions in the online discussion forums. Furthermore, previous research indicated that successful mentoring in pedagogical knowledge depends not only on the mentor's actions, but also on the actions of the novice teacher. Novice teachers who have an active and reflective attitude during mentoring will demonstrate a willingness to receive the mentor's guidance about pedagogy and implement it (Nam et al., 2013). Both Elizabeth and Vincent displayed comments on the discussion boards, which were evidence of being engaged in reflecting on their practice and receiving their mentors' guidance; they also noted their growth in pedagogy in their interviews.

Modeling. For Hudson (2004a), a mentor demonstrates desirable teaching traits and practices, which novice teachers have the opportunity to observe and then imitate.

The current research on modeling as a mentoring activity is limited and is often focused on novice teachers observing more experienced peers or master teachers deliver instruction (Eri, 2014; Hendry et al., 2014; Reese, 2013; Tricarico & Yendol-Hoppey, 2012). In my study, the novice teachers did not have the opportunity to observe their mentors instruct students. In Elizabeth's group, however, the novice teachers did have the opportunity to view video capture of Elizabeth modeling how to collect and analyze student data, which was a dimension of system knowledge for special education. As a mentoring activity, modeling primarily emerged through the mentors describing their professional practices in the discussion forums and through the mentors displaying teaching attitudes and dispositions in their discussion posts, such as resilience when facing challenges, critical reflection on practice, or making progress towards professional goals. Mentors described how they would establish their classroom environments, design instruction, or conduct student assessment. Mentors also modeled professional behaviors to help their novice teachers interact with parents, students, and colleagues and to help them develop a growth mindset. The modeling of these professional behaviors in virtual mentoring extended research from in-person mentoring. In exchanges of in-person mentoring, previous research identified that mentors could model how to communicate with parents (Clark & Byrnes, 2012), how to develop a growth mindset (Gardiner 2012), and how to develop habits of critical reflection on practice (Olsher & Kantor, 2012).

System knowledge. Mentors play a key role in helping novice teachers acclimate to their jobs in their education systems. In my study, the largest number of weekly discussion topics in the mentoring forums for both mentoring pairs related to system

knowledge, and Samantha and Elizabeth spent a noticeable portion of their mentoring

activities helping their novice teachers develop system knowledge for special education.

In his model, Hudson named this mentoring factor "system requirements," and

emphasized curriculum and state policy as key elements in the factor, but they did not

have a strong representation in the data of my study. Instead, mentoring in system

knowledge was primarily related to conducting tasks related to special education and

developing relationships with stakeholders in the education system, including parents,

colleagues, and students.

Research shows that both mentors and mentees sometimes perceive that inducting

a novice teacher into the education system where they will work is a mentor's primary

task (Frels et al., 2013; Mann & Tang, 2012). Mentors help novice teachers gain

knowledge of school policies, procedures, and school norms and guide them in managing

their new responsibilities (Gut et al., 2014; Nasser-Abu Alhija & Fresko, 2014), as well

as assist them in developing new collegial relationships to support their work (Israel et

al., 2014). In my study, both Elizabeth and Samantha guided their novice teachers in

managing their new responsibilities as special education teachers and in developing

strategies for building relationships in their school systems, but the data did not show

evidence of orienting the novice teachers to school specific policies, procedures, or

norms. This gap in mentoring of system knowledge in my study aligns with the research

of another virtual mentoring study of special education teachers. In that study, the novice

teachers indicated that virtual mentoring provided incomplete support (Hunt et al., 2013).

While the novice teachers had access to a large volume of online resources and their

mentors were responsive and knowledgeable, the mentees were not confident that their online mentors—who did not know their specific teaching contexts—could offer the best support. Mentor Elizabeth expressed this same concern about virtual mentoring, that she could help her novice teachers develop system knowledge about special education up to a certain point, but then the nuances and specific procedures of their teaching contexts were unknown to her and she was unable to provide complete assistance in response to her novice teachers' questions. Vincent addressed this same limitation. In his interview, he mentioned turning to a district coordinator when he had technical questions that his virtual mentor could not answer.

Personal attributes of the mentor. The attributes of a mentor impact mentoring interactions. In my study, Samantha and Elizabeth were supportive, responsive to their novice teachers' needs, positive, and knowledgeable, as well as demonstrating a growth mindset. Many of these qualities were also discovered in a qualitative study that explored factors for building trust in a mentoring relationship. Gardiner (2012) noted that mentors strengthen their mentoring relationship when they have sustained contact with a novice teacher over time, they withhold judgment, they express empathy, and they help to move the novice from a survival mindset to a growth mindset. Other important mentor qualities include an approachable personality, availability, and a collaborative attitude (Hallam et al., 2012). The mentor attributes described by Gardiner and Hallam et al. were demonstrated in the online discussion forum of this study, thus extending in-person mentoring research to virtual mentoring. Furthermore, research indicates that effective mentors are focused on helping mentors grow in their professional practice (Stanulis et

al., 2014; van Ginkel, Oolbekkink, et al., 2016), they express affirmation to the novice (van Ginkel, Oolbekkink, et al., 2016), and they exchange ideas as a colleague with the novice (Chisholm & McPherson, 2014). Again, these mentoring behaviors were demonstrated in the online discussions, moving research on in-person mentoring to the virtual mentoring domain.

Another body of research demonstrates the importance of a mentor receiving professional development, so they are equipped with the knowledge to help beginning teachers (Aspfors & Fransson, 2015; Pogodzinski, 2012). Mentors who receive professional development to strengthen their mentoring skills enhance their abilities to help their novice teachers grow professionally (Ulvik & Sunde, 2013), to guide their novices to become reflective practitioners (Langdon, 2014), and to use habits of inquiry to help novices construct knowledge of pedagogy (Langdon, 2014). The NTS program provided professional development training for Samantha and Elizabeth and engaged them in a professional learning community of other NTS mentors. My study demonstrates similar mentor behaviors that were associated with professional development in the research, thus extending research on mentor professional development to virtual mentoring.

Limitations of the Study

The qualitative research design of this study created a few limitations. The first limitation was related to the number of cases; this study only contained one case of virtual mentoring. Yin (2014) asserted that one or two cases can create literal replication of a study, and four to six cases are needed to create theoretical replication. Because this

study had only one case of virtual mentoring, only literal replication is possible, and theoretical replication is not achievable.

The second limitation of this research was related to the number of participants in the study. The sample size of two mentors and two novice, rural teachers was small. As a result, the small sample size reduced the transferability of the findings. The display of Hudson's five factors of mentoring in the virtual mentoring exchanges may not represent how Hudson's factors emerge in other virtual mentoring interactions.

The third limitation was related to the data collection. Interviews and reflective journals were collected four to five months after the 2016-17 academic year when the virtual mentoring took place. This elapsed time may have affected participants' memories and perceptions of virtual mentoring interactions. Furthermore, only one interview and one reflective journal were collected from each participant at one point in time. Multiple interviews and reflective journal responses may have provided richer data. Another limitation of the data collection was that I did not have access to all of the virtual spaces in the NTS portal. For example, the mentors and novice teachers mentioned the video observations of teaching and subsequent conversations with feedback, but I was unable to view the teaching videos or actual feedback dialogue. I knew that feedback on teaching happened, but I did not observe those feedback interactions firsthand. Access to those elements could have provided a deeper understanding of the operation of feedback in this virtual mentoring case.

Recommendations for Future Research

Recommendations for future research are related to the findings of this study and gaps in the review of the literature. The first recommendation for future research is to conduct virtual mentoring studies with novice teachers from other disciplines and grade levels. The sample size for this study was only two novice teachers, and both of them were in the field of special education and worked primarily with middle and high school students. More research is needed to understand how Hudson's five factors of mentoring emerge in virtual mentoring of novice general education teachers, particularly those who work with younger learners or those who teach in a designated subject area.

My second recommendation for future research is related to virtual mentoring of system knowledge. In this study, weekly discussion topics related to system knowledge were common in the online discussion forums; however, mentor Elizabeth perceived barriers to effectively supporting her novice teachers in developing system knowledge for their unique education contexts. This finding seems to suggest that there are some dimensions of system knowledge suitable for general conversation in virtual mentoring, but other dimensions of system knowledge are limited by a lack of proximity between the mentor and novice teacher. My study and the research of Hunt et al. (2013) have demonstrated that even though virtual mentoring connects novice teachers to responsive and knowledgeable mentors who can provide numerous teaching resources, there are dimensions of mentoring in system knowledge, which are not easily developed when a mentor does not share the same education system with a novice teacher. More research is needed to explore virtual mentoring in system knowledge for novice teachers.

My third recommendation for research relates to virtual mentoring in pedagogical knowledge. Studies of in-person mentoring have demonstrated that mentoring in pedagogical knowledge influences important outcomes for student learning. Through mentoring in pedagogical knowledge, novice teachers can increase student-centered, inquiry-based learning; effectively use questions to stimulate student thinking; and increase active student participation in class (Nam et al., 2013). Furthermore, novice teachers can strengthen their instructional quality and develop specific strategies for leading classroom discussions (Stanulis et al., 2012), as well as plan instruction with learners in mind (Cajkler & Wood, 2016) and create meaningful learning experiences to help students access complex concepts (Ramnarain & Ramila (2012). In my study, the online discussions demonstrated that mentoring in pedagogical knowledge was frequently present. However, the data did not demonstrate how this type of mentoring was impacting student learning in the ways that previous research has indicated. More research is needed to explore how virtual mentoring in pedagogical knowledge impacts student outcomes.

My fourth recommendation for further research relates to virtual mentoring as a community activity. The NTS program provided a virtual, mentoring experience as a community activity. Both Vincent and Denise acknowledge the advantage of virtual mentoring in a cohort of several novice teachers who work with a mentor because it allowed them to receive support not only from their mentor, but also from their peers. Samantha and Elizabeth also saw advantages of virtual mentoring in a group to help reduce the isolation of novice teachers, by connecting novices to educators with similar

teaching challenges and helping them understand that struggles were common. These pragmatic and affective benefits of virtual mentoring in a community are not clearly represented in existing research on virtual mentoring. Studies related to mentoring through wiki communities present mixed findings. Some of these studies indicated that novice teachers found important affective support and practical help in online communities (Bell-Robertson, 2014; Taranto, 2011). Other studies indicated that virtual mentoring in online forums did not provide adequate support (Hutchison & Colwell, 2012; Ruane & Koku, 2014). More research is needed to explore how virtual mentoring in a virtual community supports novice teachers.

A final suggestion for future research relates to the conceptual framework chosen for this study. Hudson's five factors of mentoring did not include reflection on practice as a key element in effective mentoring. A long-standing body of research supports the importance of novice teachers reflecting on their practice in order to grow professionally (Beauchamp, 2015; Daniel, Auhl, & Hastings, 2013; Harrison, Lawson, & Wortley, 2005; Naidoo & Kirch, 2016; Romano, 2005; Yost, 2000). In this study, critical reflection on practice was a common activity in the virtual mentoring interactions of the online discussions, yet it was not an element of mentoring identified in Hudson's model. In the discussion forums, the mentors reflected on their own practice, modeling both teaching behaviors and teaching attitudes. Through effective questioning strategies, the mentors also invited their novice teachers to reflect on their teaching, and as Samantha testified, she found the conversations with her virtual mentees to have more depth of reflection than her conversations with her in-person mentees. While reflection on practice is

documented in previous research as an important element in the professional growth of novice teachers, that research was primarily related to in-person mentoring. The current literature on virtual mentoring is lacking in studies related to the benefits of asynchronous online discussions for facilitating novice teacher reflection on practice. More research is needed to explore how virtual mentoring supports critical reflection on practice by novice teachers.

Implications for Social Change

I will discuss implications of this study for positive social change in relation to the individual, the educational organization, and society. In relation to the individual, findings from this study contribute to positive social change by demonstrating that virtual mentoring has the possibility to provide the support that novice teachers perceive they need. Previous research about novice teacher perceptions of their own needs underscores the importance of providing novice teachers with mentors who share similar grade level and content areas (Frels et al., 2013; LoCasale-Crouch et al., 2012; Roff, 2012), who are available for conversations on teaching practice (Gardiner, 2012; Karhs & Wells, 2012), who help them reflect on their teaching (Gardiner, 2012), and who can help them solve common teaching problems (Paris, 2013; Hobson et al., 2012). Findings from my study demonstrate that these dimensions of mentoring were present in the virtual mentoring exchanges between novice, rural teachers and their mentors. Thus, virtual mentoring is a potential type of innovative mentoring to meet the perceived needs of support for novice, rural teachers.

In relation to the educational organization, findings from this study contribute to positive social change by providing additional understanding of how virtual mentoring might meet the needs of novice teachers in rural school districts. This study demonstrates that virtual mentoring is a possible channel of support for novice, rural teachers. Rural teachers often feel professional isolation due to their geographic location (Goodpaster et al., 2012; Hellsten et al., 2011). Rural schools are frequently small with limited material and personnel resources, which may impede the job satisfaction of rural teachers (Lind & Stjernstrom, 2015; Handal et al., 2013; Cuervo, 2012). Research shows that these types of limitations may impact rural teachers' intentions to leave their jobs. For example, in an Australian study of 191 teachers from 27 rural/remote schools, factors contributing to teacher attrition included: professional isolation, lack of opportunities for professional development, lack of teaching resources, and lack of mentorship in their content areas (Handal et al., 2013). Novice teachers in my study indicated that their virtual mentoring gave them access to teaching resources, access to the expertise of an experienced teacher in their specialization, and access to dialogue that enhanced their professional growth. These findings indicate that virtual mentoring might be an effective solution for supporting novice, rural teachers to remain in the workplaces of their local schools.

In relation to society, this study contributes to positive social change by demonstrating that virtual mentoring is a possible solution for states with high populations of rural teachers. Research has indicated that novice rural teachers are at a special risk of stress from a lack of mentoring support, professional isolation, and lack of teaching resources (Broadley, 2012; Burton, Brown, & Johnson, 2013; Handal et al.,

2013). Of concern is the higher rate of attrition among rural teachers than their urban or suburban counterparts (Goldring et al., 2014). As increasing numbers of novice teachers have entered the profession in the past three decades, teacher-mentoring programs have proliferated across the United States (Ingersoll, 2012). Numerous states require mentoring as part of novice teacher induction, and many of those states include rural schools. In regions of the U.S. where it is difficult to provide effective mentor support for novice, rural teachers, virtual mentoring may be an innovative solution.

Conclusion

For three decades, the U.S. Department of Education has gathered data related to teachers leaving the profession (Goldring et al., 2014). The attrition rate for beginning teachers has risen to nearly 50% in some regions of the United States (Ingersoll, 2012, and some research indicates that attrition is higher among teachers in rural settings (Goldring et al., 2014). Conditions of rural schools can put unique stresses on rural teachers, including professional isolation (Broadly, 2012; Goodpaster et al., 2012; Handal et al., 2013), a lack of material and personnel resources (Morton & Harmon, 2011; Vaughn & Saul, 2013), and increased workloads (Azano & Stewart, 2015). These stresses can be especially acute for rural, novice teachers who lack experience (Sharplin, 2014). For novice teachers in rural schools, mentoring could be critical support for reducing professional isolation (Hellsten et al., 2011). Exploring new methods for offering mentoring to novice, rural teachers is an important area for research.

In existing research, virtual mentoring of novice teachers has shown promise as an innovative solution for teachers with limited access to mentoring support. Before this

study was conducted, the majority of research on mentoring was related to in-person mentoring. The results of this study extended knowledge of effective in-person mentoring into the virtual mentoring domain. Using Hudson's (2004a) model of mentoring as a conceptual lens, the mentoring of this study demonstrated the presence of five factors of effective in-person mentoring—personal attributes of the mentor, feedback, modeling, pedagogical knowledge, and system knowledge—in the virtual interactions of the participants. Specifically, results indicated that virtual mentoring provided novice teachers with flexibility, responsive mentoring, access to expertise, and a professional learning community for the sharing of resources, receiving affective support, engaging in reflection, and developing pedagogical and system knowledge through modeling and feedback. The growing body of research on virtual mentoring of novice teachers, and the results of this study, indicate that virtual mentoring has the potential to effectively support novice teachers who work in contexts with limited access to mentoring.

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Appendix A: Letter of Cooperation

████████ ██████

April 18, 2017

Dear Kendra Turpeinen,

Based on my review of your research proposal, I give permission for you to conduct the study entitled *Exploring Factors of Effective Virtual Mentoring of Novice Rural K-12 Teachers* within the ███████████████████████ Program at the ███████ ███. As part of this study, I authorize you to contact potential participants in our ██ program who meet your inclusion criteria. After you have selected the participants, I authorize you to conduct individual interviews with them, to collect their responses from a reflective journal, to collect archived asynchronous mentoring conversations from our learning management system, to ask them to review the tentative findings of your study for credibility, and to receive a brief summary of the results. I understand that the participation of these individuals will be voluntary and at their own discretion.

We understand that our organization's responsibilities include (a) providing the names and contact information of potential participants who meet the inclusion criteria of this study and (b) providing you access to the academic year 2016-17 online spaces where mentoring interactions occur between mentors and mentees who consent to participate. We reserve the right to withdraw from the study at any time if our circumstances change.

I also understand that I will have the opportunity to review the research related to this study and offer feedback.

I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Institutional Review Board (IRB) at Walden University.

Sincerely,

Authorization Official

██████████ ██████

Appendix B: Letters of Invitation

Dear Teacher,

My name is Kendra Turpeinen and I am a PhD student at Walden University, which is an accredited institution of higher learning. I am currently researching how virtual mentoring with digital communication tools can support beginning teachers who work in rural schools. I obtained your name and contact information through the ███████████ ███████████ at the ███████████.

I am inviting rural teachers in the first 1 to 3 years of their careers to participate in my research study so I can explore virtual mentoring as a form of support for new teachers in rural settings. Although numerous researchers have investigated in-person mentoring, very few have examined virtual mentoring, and even fewer have explored how virtual mentoring supports rural teachers. This study will contribute to a growing body of research related to how digital communication tools can support professional growth among new teachers and how virtual mentoring can improve teacher induction in the 21st century.

Your participation in this research is voluntary and involves completion of a short demographic questionnaire, participation in a 30 to 45 minute interview about your virtual mentoring experiences, and providing brief responses to five reflective questions that I will email to you.

If you are interested in participating in this study, please contact me by email at ███████████████████████. I will then send you specific details about the research activities and procedures in a subsequent email.

Thank you for considering this opportunity to participate in this important research.

Sincerely,

Kendra Turpeinen
Walden University Doctoral Candidate
███████████████████████

Dear Mentor,

My name is Kendra Turpeinen and I am a PhD student at Walden University, an accredited institution of higher learning. I am currently researching how virtual mentoring with digital communication tools can support beginning teachers who work in rural schools. I obtained your name and contact information through the ▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮▮▮▮▮ Program at the ▮▮▮▮▮▮▮▮▮▮.

I am inviting experienced teachers who are mentoring novice teachers using digital communication tools to participate in my research study in order to explore virtual mentoring as a form of support for new teachers in rural settings. While numerous researchers have investigated in-person mentoring, very few have examined virtual mentoring, and even fewer have explored how virtual mentoring supports rural teachers. This study will contribute to a growing body of research related to how digital communication tools can support professional growth among new teachers and how virtual mentoring can improve teacher induction in the 21st century.

Your participation in this research is voluntary and involves completion of a short demographic questionnaire, participation in a 30 to 45 minute interview about your virtual mentoring experiences, and providing brief responses to five reflective questions that I will email to you.

If you are interested in participating in this study, please contact me by email at ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮. Then I will send you specific details about the research activities and procedures in a subsequent email.

Thank you for considering this opportunity to participate in this important research.

Sincerely,

Kendra Turpeinen
Walden University Doctoral Candidate
▮▮▮▮▮▮▮▮▮▮▮▮

Appendix C: Interview Guides

INTERVIEW GUIDE FOR NOVICE TEACHERS

PART 1: DEMOGRAPHIC INFORMATION

Your Name:
# of Students in Your School Building:
Type of School: (Circle one)   Elementary   Middle School   High School
Your Teaching Licensure:
Current Teaching Assignment:
Please briefly list your Professional Experiences in the Field of Education   Title   Date(s) of Employment

PART 2: INTERVIEW QUESTIONS FOR NOVICE TEACHERS

Thank you for participating in this study. The purpose of the questions I'm about to ask you is to examine mentoring activities to better understand virtual mentoring as a means of supporting novice rural teachers. The purpose is not to evaluate the mentoring relationship. As you answer the interview questions, please keep in mind mentoring activities that would support your responses.

1. Virtual mentoring is when a mentor and mentee interact by using digital communication tools because they are unable to meet in person. What activities are part of your virtual mentoring?

2. How would you describe the mentoring support you receive from your virtual mentor?

3. As a new teacher, what types of virtual mentoring support do you believe have been the most beneficial to you?

4. As a new teacher, what types of mentoring support do you wish you had more of?

5. If I were a teacher wanting to receive support through virtual mentoring, what would you tell me were the reasons to participate?

6. What are the advantages of virtual mentoring? Are any of those advantages unique to virtual mentoring? If so, which ones?

7. Is there anything else about your experiences with virtual mentoring that you would like to share?

INTERVIEW GUIDE FOR VIRTUAL MENTORS

PART 1: DEMOGRAPHIC INFORMATION

Your Name:
Your Teaching Licensure:
Current Teaching Assignment (if applicable):   If you are currently teaching, how many students are in your school building? If you are currently teaching, what type of school do you work in? (Circle one)   Elementary   Middle School   High School
Mentoring Background How many total years have you mentored novice teachers? Of those years, how many have you been involved in virtual mentoring?
Please briefly list your Professional Experiences in the Field of Education: Title   Date(s) of Employment

PART 2: INTERVEW QUESTIONS FOR MENTORS

Thank you for participating in this study. The purpose of the questions I'm about to ask you is to examine mentoring activities to better understand virtual mentoring as a means of supporting novice rural teachers. The purpose is not to evaluate the mentoring relationship. As you answer the interview questions, please keep in mind mentoring activities that would support your responses.

1. Virtual mentoring is when a mentor and mentee interact by using digital communication tools because they are unable to meet in person. What activities are part of your virtual mentoring?

2. How would you describe the mentoring support you offer your mentee?

3. As a mentor, what types of mentoring support do you believe are most beneficial to a new teacher? How does virtual mentoring encourage you to offer that type of support? What elements of virtual mentoring make it challenging to be an effective mentor?

4. What are the advantages of virtual mentoring? Are any of those advantages unique to virtual mentoring? If so, which ones?

5. If I were an experienced teacher wanting to participate in virtual mentoring, what would you tell me were the reasons to participate?

6. Is there anything else about your experiences with virtual mentoring that you would like to share?

Appendix D: Archival Data Collection Form

Archival Data Form	
Date	
Time	
Participants	
Criteria	
Purpose of Interaction	
Topic/Content of Interaction	
Use of Interaction	

Appendix E: Reflective Journal Questions

NOVICE TEACHER REFLECTIVE JOURNAL QUESTIONS

Dear Teacher,

Thank you for providing interview information about your experiences participating in virtual mentoring to receive teaching support. In order to help me explore more about your experiences, please answer these reflective questions by writing one or two paragraphs for each question. The purpose of this data is to examine mentoring activities to understand virtual mentoring as a means of supporting novice rural teachers. The purpose is not to evaluate the mentoring relationship. As you answer the questions, keep in mind mentoring activities that would support your responses.

1. How would you describe your mentor? What personal characteristics about your mentor have helped or hindered your professional growth?

2. How has your mentor offered guidance that has helped you to improve your teaching practice?

3. In what ways has your mentor modeled effective teaching practice to you?

4. How has feedback been a part of your mentoring interactions?

5. One of the ways that a mentor can help a new teacher is to guide them in understanding the professional requirements of teaching. These requirements might include understanding curriculum mandates, school policies, and/or professional standards. Describe how your mentor has helped you understand the professional requirements of teaching.

6. Think about your relationship with your virtual mentor. What three words describe that relationship? Please provide an example to support each word choice.

Your responses will be part of the data collection for this study. Please reply within two weeks of receiving this email. You may email your reflections back to me at

███████████████████████

Sincerely,

Kendra Turpeinen
Walden University Doctoral Candidate
███████████████

MENTOR TEACHER REFLECTIVE JOURNAL QUESTIONS

Dear Mentor,

Thank you for providing interview information about your experiences participating in virtual mentoring to offer teaching support. In order to help me explore more about your experiences, please answer these reflective questions by writing one or two paragraphs for each question. The purpose of this data is to examine mentoring activities to understand virtual mentoring as a means of supporting novice rural teachers. The purpose is not to evaluate the mentoring relationship. As you answer the questions, keep in mind mentoring activities that would support your responses.

1. What skills and knowledge from your own teaching practice have you shared with your mentee to help him or her improve instructional practice?

2. How have you modeled effective teaching practice to your mentee?

3. How has feedback been a part of your mentoring interactions?

4. One of the ways that a mentor can help a new teacher is to guide them in understanding the professional requirements of teaching. These requirements might include understanding curriculum mandates, school policies, and/or professional standards. Describe how have helped your mentee understand the professional requirements of teaching.

5. How would you describe yourself as a virtual mentor? What personal characteristics do you feel you can offer to mentees to support their professional growth through virtual mentoring?

6. Think about your relationship with your mentee. What three words describe that relationship? Please provide an example to support each word choice.

Your responses will be part of the data collection for this study. Please reply within two weeks of receiving this email. You may email your reflections back to me at

Sincerely,

Kendra Turpeinen
Walden University Doctoral Candidate

Appendix F: Letter to Discussion Forum Members Not Participating in the Study

Dear Educator,

My name is Kendra Turpeinen and I am a PhD student at Walden University, which is an accredited institution of higher learning. I am currently researching how virtual mentoring with digital communication tools can support beginning teachers who work in rural schools.

To conduct my research, I have partnered with the ███████████ to collect data about the ████████████████████████████, in which you participate. I will not be collecting any data from you, but I wanted you to know that I will be gathering data from your colleagues in your cohort in the ████ program. The only data used in this study will come from participants who have signed consent forms.

Sincerely,

Kendra Turpeinen
Walden University Doctoral Candidate
████████████████████

Appendix G: Author's Permissions

Dear Dr. Hudson,

I am a PhD candidate with Walden University in the United States. My qualitative study is titled *Exploring Factors of Effective Virtual Mentoring of Novice Rural K-12 Teachers*. I am researching how rural teachers are supported by digital tools to receive mentoring during their induction years from a virtual mentor.

Your model of the five-factors of effective mentoring is the conceptual framework for my study. May I use a figure from your article entitled "Development of an Instrument: Mentoring for Effective Primary Science Teaching" which was published in 2005 in *Science Education*? This figure would be captured as a screen shot image from the original article and copied onto page 27 of Chapter 2 in my literature review. I would include a citation under the figure and would note your permission.

I've attached the figure for your review so you can see how it will look in my document.

Sincerely,

Hi Kendra,

Yes you may use the CFA model for the five factors.

You may also use the graphic here indicating the five factors. Name of the model is: Hudson's (2004) Mentoring Model.

Hudson, P. (2004). Specific mentoring: A theory and model for developing primary science teaching practices. *European Journal of Teacher Education, 27*(2), 139-146.

Please let me know the outcome of your thesis.

Regards,

Peter